



STATE OF MICHIGAN PROJECT MANAGEMENT METHODOLOGY



**Michigan Department of Technology,
Management & Budget**

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REVISION HISTORY

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May 2000	n/a	Initial document release.
May 2001	All	Various minor updates.
December 2004	All	Clarification and expansion of lessons learned process and template, continuous improvement process, consolidation and streamlining of most sections, updates to templates and diagrams.
May 2014	All	Major update and addition of new sections to align with current SUITE processes and industry best practices.

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Project Management Methodology, fourth release, May 2014	
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PREFACE

Purpose

This project management methodology is a key component of the State Unified Information Technology Environment (SUITE) and establishes formal project management practices. The methodology is sufficiently generic for use in all projects within the State of Michigan (SOM). It is transferable from project to project but is not intended to be the sole source of information on project management.

Methodology Benefits and Compliance

This methodology is based on industry best practices and provides in-depth guidance for the entire project life cycle.

SOM Administrative Guide Policy 1355 requires statewide compliance and applies to all executive branch departments, agencies, trusted partners, boards or commissions using the State of Michigan information technology resources.

Update Process and Cycle of this Guide

This is the fourth edition of the Project Management Methodology (May 2014). Changes and improvements to all SUITE processes, including this guide, are a result of user input. Send improvement suggestions to SUITE@michigan.gov.

Changes in this Fourth Release (May 2014) of the PMM

This fourth release of the State of Michigan Project Management Methodology is long overdue and is the result of almost a decade of experience, lessons learned, user input, and organizational maturity in using the PMM and SUITE processes. Changes include:

- Significant updates and creation of new sections to align with current industry best practices
- Reliance upon and reference to the fifth edition of the Project Management Body of Knowledge (PMBOK) as an authoritative source
- Updates to reflect usage of PMM forms published in May 2013
- Updates to reflect usage of Systems Engineering Methodology (SEM) and SUITE processes, forms, and overview diagrams
- Removal of forms from the PMM document itself
- Removal of links to various documents, resources, and references in the body of the document for ease of maintenance. Links are available only in this preface and in the resources and reference section.
- Overall streamlining and simplification of the document

Audience

The Project Management Methodology is intended for all project stakeholders, including, but not limited to:

- Sponsors
- Project managers
- Project team members (DTMB, customers, and vendors)
- Project management mentors and instructors
- Project Management Offices (PMO)
- Enterprise Portfolio Management Office (EPMO)
- Project quality assurance teams
- Individuals interested in learning more about project management

CHAPTER - 1.0 OVERVIEW

1.1 Project Management Methodology

According to the Project Management Institute's (PMI®) Project Management Body of Knowledge (PMBOK® fifth edition), "Project Management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements."

The State of Michigan Project Management Methodology (PMM) provides guidance to promote the on-time, on-budget delivery of projects that meet or exceed customer expectations. The PMM is consistent with industry standard best practices and relies on the PMBOK as its authoritative source. The PMM is a key component of the State Unified Information Technology Environment (SUITE).

Consistent use of the industry standard best practices and repeatable processes in the PMM significantly increases the likelihood of successful project completion. Best practices are considered best practices because they predictably deliver the results that customers expect. Key components of this predictability are a best practices library, lessons learned, easy access to PMM documentation, and co-location of project management staff. An additional benefit of using a standard PMM is the increased mobility of project managers across organizational units.

Project lifecycle phases include:

1. Initiation
2. Planning
3. Execution
4. Monitoring and Control
5. Closeout

Project management knowledge areas include:

1. Scope Management
2. Time Management
3. Quality Management
4. Risk Management
5. Communication Management
6. Procurement Management
7. Cost Management
8. Human Resource Management
9. Integration Management
10. Stakeholder Management

The following is a graphical representation of the lifecycle phases and knowledge areas.



Figure 1 Life Cycle Phases and Knowledge Areas

1.2 Project Definition

“A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end.” (PMBOK fifth Edition).

Each project is unique. However, the standard project management methodology is applicable and required for all projects regardless of size and complexity. Each project must have well defined goals and identify both constraints and assumptions.

- **Well-defined Goals**

Projects require well-defined goals to determine completion. Without well-defined goals and objectives, a project lacks purpose. Most projects begin as an idea to address a business need or resolve a problem.

The problem definition needs to be carefully crafted and well thought out. This will determine the project objective, focus, and approaches for resolution. The focus is generated in terms of requirements, deliverables, and milestones. Without a clearly defined focus and a stated objective, the project may stray off course (not solving the problem for which it was intended), or it may incur cost and time overruns and ultimately is unsuccessful.

- **Project Constraints**

All projects have constraints, and these need to be defined from the outset. The most common constraints are scope, quality, schedule, budget, resources, and risks. Balancing these often competing constraints is the foundation of effective project management.

- **Project Assumptions**

Similarly, certain criteria relevant to a project are assumed to be essential. For instance, it is assumed that an agency will have the foresight to make the necessary budget appropriations to fund projects. Project assumptions need to be defined before any project activities take place so that time is not utilized on conceptualizing and initiating a project that has no basis for funding.

Each project takes on a different form and presents various degrees of uncertainty. Managing a project usually requires dividing the project into more manageable pieces called phases. Phases allow the project team to more effectively manage and control project activities throughout the life of the project. Collectively these phases are called the project life cycle.

The life cycle phases represent project activities from initiation through closeout. The phases overlap and typically resemble the lifecycle as shown below.

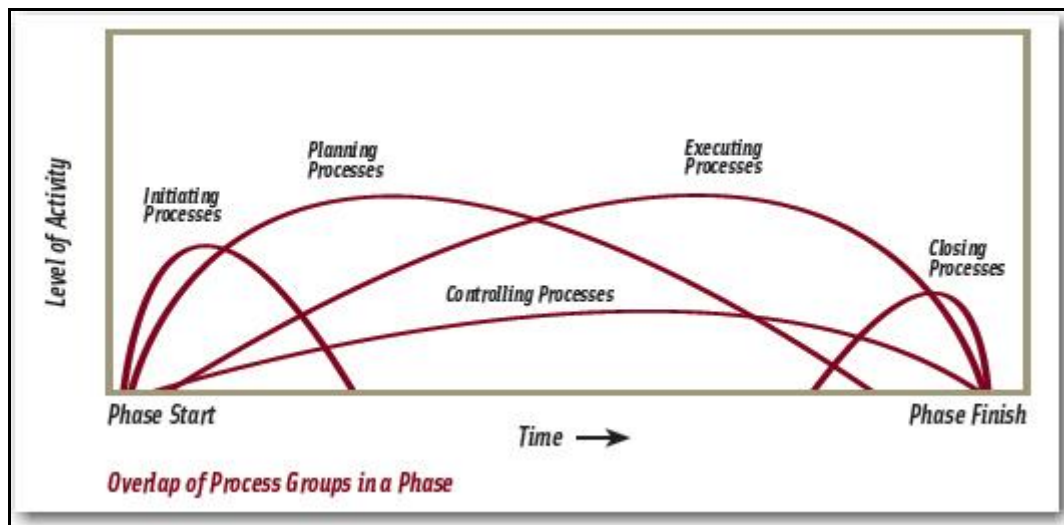


Figure 2 Life Cycle Project Phase Overlap

1.3 Project Management is an Iterative and Ongoing Process

Project management is an iterative process. For example, the planning phase is a refinement of the initiation phase. In some instances, phases may be repeated because of changes within the project. Also, project phases may be performed simultaneously as well as sequentially. For instance, the planning, execution, and control phases may be performed in parallel as changes are made to the project baseline.

Other activities, including most of the project management knowledge areas, are ongoing and affect each and every phase of the project. For example, scope management can be both iterative and ongoing. The following paragraph about defining scope is extracted from the PMBOK fifth edition and provides a good description of how this knowledge area is applied throughout the project life cycle.

“The preparation of a detailed project scope statement is critical to project success and builds upon the major deliverables, assumptions, and constraints that are documented during project initiation. During project planning, the project scope is defined and described with greater specificity as more information about the project is known. Existing risks, assumptions, and constraints are analyzed for completeness and added or updated as necessary. The define scope process can be highly iterative. In iterative life cycle projects, a high-level vision will be developed for the overall project, but the detailed scope is determined one iteration at a time and the detailed planning for the next iteration is carried out as work progresses on the current project scope and deliverables.”

As scope changes, it is likely that management of time, risk, communication, cost, human resources, and stakeholders will also change.

1.4 Business Needs Drive the Use of Technology

Although the PMM is applicable to all projects, most projects involve some aspect of technology. Technology is playing an increasingly critical role in ongoing operations, development of new services to meet citizen and business needs, optimizing efficiency, and sharing solutions across government boundaries. However, it is important to recognize that meeting business needs and solving business problems are the overarching drivers, and that technology is an enabler to meet customer expectations. Collaboration between business and technical teams is a key ingredient for project success. The project manager plays a key role in building and maintaining productive relationships to foster collaboration.

As systems-oriented organizations direct more effort and resources toward improving efficiency and effectiveness through increased use of technology, it cannot be assumed that the business processes currently in place are compatible with the technical solutions being introduced. A review of current business processes is needed to ensure compatibility between suggested technology improvements and the current way of doing business.

In summary, the business processes should be driving the technology, not the technology driving, or greatly influencing, the business processes. Ideally technology is an enabler and not a driver.

1.5 State of Michigan Project Management Methodology Basics

All projects require project management to ensure project success.

Key components of the PMM include:

- Project Lifecycle Phases
 - Initiation

- Planning
 - Execution
 - Monitoring and Control
 - Closeout
- Forms
 - Project Charter
 - Project Management Plan
 - Project Lessons Learned
 - Project Closure Report
- Enterprise Project Portfolio Management (PPM) Tool
 - Schedule
 - Budget
 - Issues
 - Risks
 - Changes
 - Status Report
 - Resource Demand and Capacity
- SUITE Touch points (as needed)
 - Systems Engineering Methodology (SEM) Lifecycle Stages
 - Enterprise Architecture
 - Infrastructure Services Request Process
 - Procurement
 - Security Assessment and Plan
 - Look and Feel / ADA Review
 - Usability and User Design
 - Disaster Recovery Planning
- Additional SUITE Guidebooks
 - Agile Process Guide
 - Project Quality Assurance (PQA) Process Manual

- Project Initiation and Purchasing Processes for Commercial Off-the-Shelf Software (COTS)
- SEM Manual
- SEM Express Manual
- Software Engineering Process Group (SEPG) Guidebook
- Structured Walkthrough Process Guide
- Stage Exit Process Guide
- Decision, Analysis, and Resolution (DAR)
- Project Estimating Guide
- Testing Process Manual
- Project Management Key Terms, Definitions, and Acronyms
- Systems Maintenance Guidebook
- SOM DTMB Project Roles and Responsibilities Reference Guide

PMM/SEM Integration

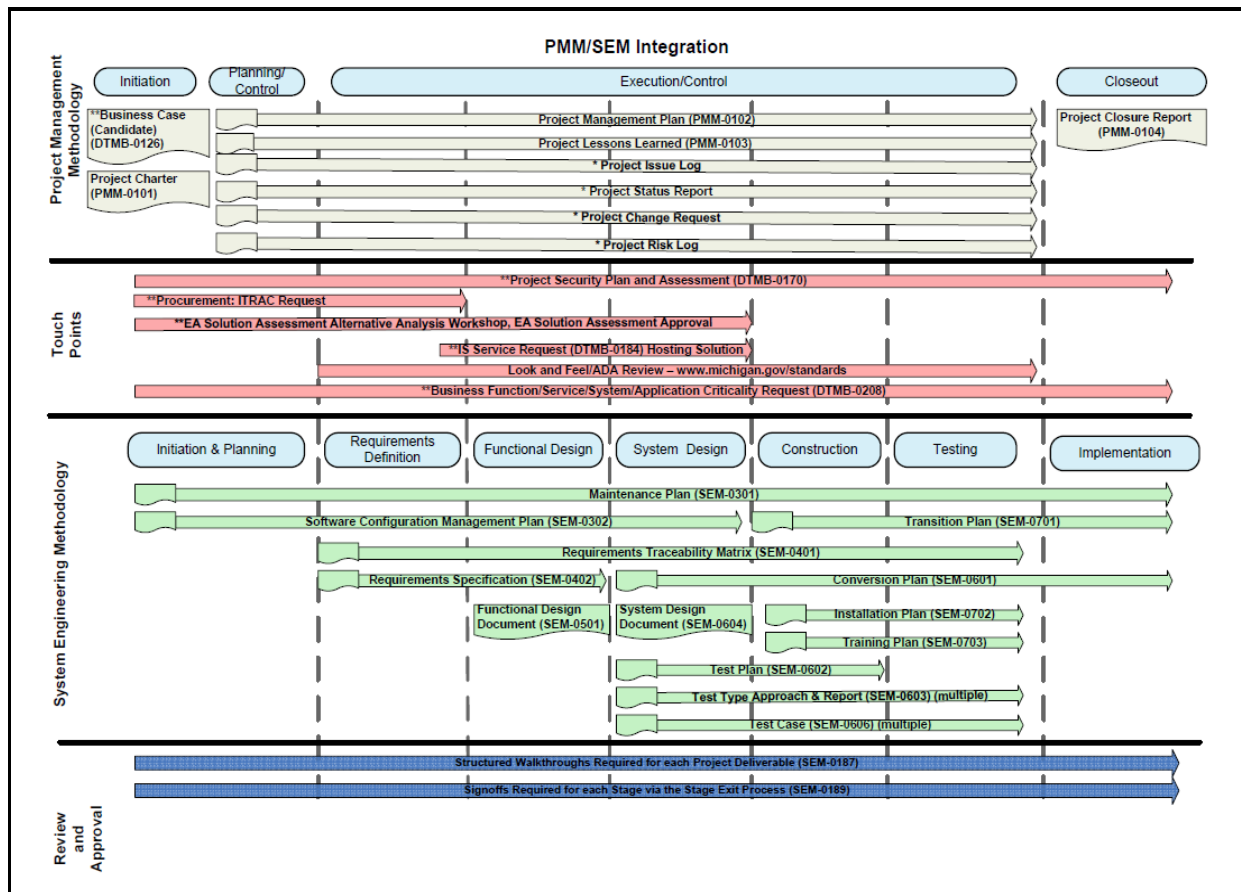


Figure 3 PMM/SEM Integration Overview

Quality is built into every aspect of the project management methodology through structured walkthroughs of every deliverable. Deliverables include products, PMM and SEM forms, and outputs from SUITE touch points.

Additional information on all PMM components, as well as current new items, are available on the SUITE intranet and internet sites.

1.6 Project Organizational Structure

The State of Michigan is a large and complex organization with a variety of project organization structures. The project executive sponsor and project manager determine the most effective organizational structure for each specific project.

The three most well-known organizational structures are the functional, projectized, and matrix hierarchies.

The functional organization is a hierarchy in which project staff members are grouped by specialty (e.g., marketing, accounting, etc.), have a clear line of authority, and have one superior within their functional organization. In this organization, the line of authority normally goes from the project manager, through a functional manager, to the project staff member, and back. Therefore, the project manager's authority over the project staff is limited.

The projectized organization typically includes co-located team members with different skill sets who stay together as cohesive units for extended periods of time and over several project engagements. Project manager authority is greatest in the projectized organization.

Matrix organizations are a combination of functional and projectized hierarchies. Matrices use a system in which project staff members are "borrowed" from their functional organizations to work on a specific project and then returned once their part of the project has been completed or their skill sets are no longer needed. There are three different types of matrix organizations:

- **Weak Matrix:** Similar to functional hierarchies in which a project manager borrows an employee from a certain functional discipline to do work on a project, but the project manager's responsibilities are to do more coordination and expedition than actual management.
- **Strong Matrix:** Similar to projectized hierarchies in which a project manager has a full-time staff borrowed from functional disciplines. The project manager exerts full authority over the staff and has a full-time project administrative staff.
- **Balanced Matrix:** A combination of weak and strong matrices whereby the project manager borrows staff as needed for the project from a functional organization. The project manager has legitimate authoritative power over the project efforts and management.

1.7 Project Roles and Responsibilities

It is important to have a defined formal structure for the project and for the project team. This provides each individual with a clear understanding of the authority given and responsibility necessary for the successful accomplishment of project activities. Project team members need to be accountable for the effective performance of their assignments.

According to PMBOK “a stakeholder is an individual, group, or organization who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project. Stakeholders may be actively involved in a project or have interests that may be positively or negatively affected by the performance or completion of the project. Different stakeholders may have competing expectations that might create conflicts within the project.” It may be difficult to manage the expectations of stakeholders because they may have conflicting goals and expectations. Active stakeholder engagement is critical to the success of the project.

1.8 Project Stakeholders

Stakeholders are individuals and organizations that have a vested interest in the success of the project. The identification and input of stakeholders help to define, clarify, drive, change, and contribute to the scope and, ultimately, the success of the project.

To ensure project success, the project management team needs to identify stakeholders early in the project, determine their needs and expectations, and manage and influence those expectations over the course of the project.

Project stakeholders include a diverse mix of people and skills. Stakeholders may include, but are not limited to, the following generic roles:

- Project Sponsor
- Project Manager
- Agency Management
- Project Team, including Subject Matter Experts (SMEs)
- Quality Assurance Team
- Customers
- Community and Local Government Entities
- State of Michigan’s Citizens and Visitors

If the project has a technology component additional stakeholders may include, but are not limited to, the following roles:

- DTMB Senior Leadership
- DTMB IT Program Manager

- DTMB Resource Manager
- EPMO Director
- PMO Director
- PMO Project Manager
- PMO Project Coordinator
- Application Architect
- Application Developer
- Business Analyst
- Enterprise Architect
- Data Modeler / Data Architect
- Database Administrator (DBA)
- Testing Team
- Agency business process owner
- Agency project coordinator
- Client Specialist
- Michigan Cyber Security Staff
- Infrastructure Specialist
- Infrastructure Management and Technical Staff
- Procurement Staff
- Documentation (user and technical) staff
- Training staff

Following are relatively high level descriptions of key project roles. More detailed information is available in the SOM DTMB Project Roles and Responsibilities Reference Guide available on the SUITE intranet site.

Project Sponsor

The project sponsor is the primary stakeholder who has the authority to decide whether or not a project should be undertaken, as well as authority to provide funding, resources and support for the project. For projects that have a technology component, it is recommended to have two sponsors, one representing the customer agency and one representing the technology organization. Active sponsorship is a critical success factor.

Project Manager

The project manager leads the project team and is responsible for the overall success of the project. The project manager has responsibility for planning and ensuring that the project is successfully completed on time, within budget, and at the required level of quality. The project manager must be assigned during the Project Initiation Phase to ensure continuity throughout the project lifecycle.

Agency Management

Agency management identifies the business need or problem and initiates the project. They are also responsible for establishing the agency strategic plan and for ensuring that projects are consistent with agency and overall state technology plans, if the project has a technology component. They are responsible for ensuring that program policies are followed.

Project Team

The project team has responsibility for conducting project activities. Project team members, as necessary, assist the project manager in planning the development effort and help ensure that commitments are met to complete the project within established schedule and budget constraints. The project team may include the subject matter experts responsible for implementing the project solution. Customers and/or stakeholders should interact with the project team to ensure that requirements are properly understood and implemented.

Subject Matter Experts (SME)

SMEs representing the business as well as technology are key players on the project team. The contributions of business SMEs include:

- Define and prioritize business requirements
- Describe business flow, through techniques such as use cases or modeling
- Define and verify data models
- Provide expertise as it relates to their specialty
- Provide input and review functional designs
- Provide time estimates for business tasks
- Lead acceptance test planning and execution
- Coordinate business resources and users
- Ensure compliance with business processes and standards

Contributions of technical SMEs include:

- System, application, and database architecture
- Application design and development
- Data modeling, design, and administration
- Testing

Quality Assurance Team

The quality assurance (QA) team evaluates overall project performance on a regular basis to ensure that the project will satisfy the required quality standards. Ideally, quality assurance is a part of each team function, with team members responsible for quality as a key component of each job assignment.

Customers

In general customers are end users of the project product, service or result. However, in the context of the project team, customers participate as advisors on requirements or validate acceptability of project deliverables. Customers may also need to be trained or to train other customers in the new process or product created as a result of the project.

Citizens and Visitors

The State of Michigan's citizens and visitors benefit either directly or indirectly from the success of all projects.

Community and Local Government Entities

State of Michigan project partners may include a variety of community and local government entities such as school districts, universities, city and county governments, nonprofit organizations, and other service providers.

1.9 Tailoring

Tailoring is the selection of the most appropriate set of standard SUITE processes to satisfy the specific needs of the project. PMM is a component of SUITE and is adaptable to meet the unique requirements of the wide variety of projects the State of Michigan desires to conduct. For projects with a technology component, tailoring the PMM means selecting appropriate SEM components.

All tailoring should be described in the Project Management Plan in the section titled Project Approach.

The flexibility of the SUITE methodology and associated processes acknowledges that large, complex projects require a more rigorous application of management processes than small, well-defined projects with readily achievable goals.

The four PMM forms used in conjunction with the automated Project Portfolio Management (PPM) tool are required for all projects, regardless of duration, budget, scope, and complexity. The PMM forms and automated processes rely on the same industry standard best practices for all projects.

The four PMM forms required for all projects are:

- Project Charter
- Project Management Plan
- Project Lessons Learned
- Project Closure Report

The PMM automated processes required for all projects are:

- Schedule
- Budget
- Issues
- Risks
- Changes
- Status Report
- Resource Demand and Capacity

For projects with a technology component, most tailoring occurs within the SEM stages or SUITE touch points. The project manager assesses the project characteristics and determines what, if any, tailoring is required to best serve the project goals and objectives. The SEM manual, SUITE overview diagrams, and process guides provide detailed information on tailoring.

The following are common examples of tailoring:

- **Maintenance**

It is a best practice to bundle multiple small maintenance efforts, generally less than 200 hours each, into a larger project. Each small maintenance effort should be described on the SEM Maintenance form and combined as a larger project. The Systems Maintenance Guidebook provides additional detail.

- **Small and straightforward software development**

The intent of SEM Express is to provide an abbreviated methodology that ensures all necessary processes are performed and documented. SEM Express defines a small project as typically one that is estimated to be 200 to 1000 effort hours (including both software development related

and project management related hours). The definition of “straight-forward” includes projects that:

- Continue to operate in the existing infrastructure environment and do not involve procurement of additional infrastructure components
- Utilize existing resources and do not procure services (except when contractors are utilized as part of a multi-project initiative)
- Are developed for a single agency
- Can be implemented without formal user training
- Have little to no risk associated with them
- Have a low degree of exposure

- **Agile projects**

The Agile Process Guide provides background information, examples, and support for using Agile software development best practices in conjunction SUITE SEM processes.

Other examples of tailoring may include COTS projects, enterprise projects, infrastructure projects, and projects that do not involve procurement, as well as projects that do not include a technology component. Other factors that influence tailoring include:

- Size and complexity of the project
- Level of project risk
- Familiarity of the project participants with each other
- Legal and legislative requirements

1.10 Relationship of Project, Program, and Portfolio Management

The PMM Manual focuses specifically on project management, however it is important to recognize the relationship between project, program and portfolio management.

- **Project Management**

A project is a temporary endeavor undertaken to create a unique product, service, or result. Project management deals with a single project (be it large or small).

- **Program Management**

A program is a group of related projects. Their management is coordinated because they may use the same resources, the results of one project feed into another, or they are parts of a larger “project” that has been broken down to smaller projects.

- **Portfolio Management**

A portfolio refers to a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives.

The following table shows key attributes of project, program, and portfolio management.

	Project Management	Program Management	Portfolio Management
Benefit	Reduce Risk	Deliver business outcomes	Optimize scarce resources
Focus	Deliver results	Coordination, governance, communications	Investment optimization
Scope	Project execution	Multi-project coordination	Proposals/projects /assets
Contacts	Project managers and sponsors	Business leaders, external partners	Senior management
Skills	Leadership	Change management	Strategy and benefits realization

Table 1 Key Attributes

1.11 Enterprise Portfolio Management Office

From an organizational perspective within DTMB, the Enterprise Portfolio Management Office (EPMO) serves as the focal point for both program and portfolio management. The EPMO develops, supports, improves, and oversees standardized processes related to project and portfolio management. The EPMO is also responsible for administering the enterprise Project Portfolio Management (PPM) automated tool.

CHAPTER 2.0 - INITIATION

2.1 The Initiation Phase

Project initiation is the first phase in the Project Management Life Cycle.

The Initiation Process Group consists of those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase. Within the initiating processes, the initial scope is defined and initial financial resources are committed. Internal and external stakeholders who will interact and influence the overall outcome of the project are identified. If not already assigned, the project manager will be selected. This information is captured in the project charter. When the project charter is approved, the project becomes officially authorized.

PMBOK®, Fifth Edition

Figure 4 – Initiation Process Group



Figure 5 - Project Management Initiation Phase

2.2 Project Initiation Overview

The State of Michigan project management methodology encompasses three primary activities during the project initiation phase. It is important to emphasize that all three activities involve collaboration between State agencies and the teams that provide technology support for their business processes. The first two activities must be completed before actual project work may begin.

- **Project request**

All requests must be entered in the enterprise PPM tool. This request is also known as a “candidate” in the PPM tool terminology. Although a project request may be submitted at any time, a comprehensive project request process known as the Call for Projects occurs annually in support of the State’s budgeting process.

- **Review project requests**

A governance group composed of appropriate agency decision makers and their technology partners review all project requests. Based on strategic as well as operational priorities, the governing body decides to approve, reject, or postpone each project request. The governance group also prioritizes and ranks all approved project requests.

- **Project authorization**

Project requests authorized for active project work by the governing group move forward to the final activity in project initiation which is development of the project charter.

Following are detailed descriptions of the three main project initiation activities.

2.3 Project Request

In the State of Michigan, the launch begins with a project request, also known as a candidate, that must be entered in the enterprise PPM tool. The project request includes components of documents and processes also commonly known as a business case or project concept.

The project request defines the project's reason for existence and ensures that the project is consistent with the agency's business plan and, where applicable, the State's information technology strategic plan. It defines the business problem, high-level approach, and other high level planning information. Ideally, the project request provides decision makers with information needed to decide if the project should be approved, rejected, or placed on hold.

Key to success of the project request process is agency ownership, partnership between the agency and its technology partner, and understanding of both strategic priorities and operational needs. The Program Management Office (PMO) facilitates the project request process and ensures that required information is entered in the enterprise PPM tool. Input to the project request is provided by agency leadership and business analysts best able to articulate the project description, benefits, costs, timeframe, and rationale.

The project request process is dynamic and occurs as good ideas are identified throughout the year. To support the State's annual budget process, the Enterprise Portfolio Management Office (EPMO) oversees a Call for Projects that enables enterprise review and analysis of all investment requests, regardless of whether the request does or does not include a technology component.

A project request includes:

- Description (brief and relatively high level)
- Proposed start and end dates
- Client
- Controlling agency

- Impact on other agencies or enterprise
- Approach and high level action plan
- Funding model and cost recovery approach
- Non-financial and public values
- Budget breakdown for 5 years, including benefits, costs, and services (high level based on historical or best available information)
- Return on Investment (ROI)
- Total Cost of Ownership (TCO)
- Using data entered in the PPM tool, automatically calculated prioritization score for subsequent use by the governing group

A project request is usually the first attempt to describe, document, and estimate the project purpose, benefits, costs, and timeframe. Project estimating is an iterative process that begins at a high level with the project request. If the project request is approved, then more detailed estimates will be developed in subsequent project phases as a more thorough understanding of the project becomes known.

2.4 Review Project Requests

Although some variation exists among State of Michigan agencies, a governance process exists at each agency as well as at the enterprise level. Entry of project requests in the enterprise PPM tool facilitates review and decision making at multiple levels throughout the State. Many project requests impact more than one agency or even the entire enterprise, requiring a single repository that can be accessed by multiple reviewers.

Regardless of the organizational context, the governance process involves decision making to reject or postpone some project requests, and then to prioritize those requests that the governing group approves. The first cut at prioritization categorizes project requests as high, medium, or low. The next step is to rank the requests in each category. The final step is to allocate available funding to the highest prioritized project requests and identify additional funding needs, if appropriate. The governance group essentially draws a line based on available funding. Those projects above the line are authorized to begin, and those below the line are placed on hold until such time as funding may be available.

The approved list of project requests may change over the course of a year as new ideas surface and priorities shift. However, the approved list of project requests serves as an annual planning guide for each agency as well as the enterprise.

2.5 Project Authorization

Approval and prioritization of the project request by the governance group constitutes authorization for the project to actually begin.

2.6 Selection of a Project Manager

The first step is to immediately assign a project manager, who will lead and manage all activities remaining in the project initiation phase. Either the project sponsor or the PMO Manager assigns the project manager. The State of Michigan has established two Civil Service classifications related to project management and project coordination. There are several levels within each classification. The project complexity, budget, duration, and team size determine appropriate project manager assignments.

Following are excerpts from the Civil Service job specification outlining key aspects of the IT project manager position:

- Provides project management and oversight for system development or system integration projects, which includes planning, organizing, communicating, consulting and serving as liaison with management and agency customers.
- Coordinate and lead a project team(s) for the duration of the project(s) and serve as a liaison to vendors.
- Provides decision-making procedures for the project team to use in resource allocation and maintains records for review of the project.
- Oversees system development and implementation ensuring adherence to SOM development methodology and standards.
- Serves as a subject matter expert regarding use of the State of Michigan's Project Management Methodology (PMM).

Typical job duties include:

- Manages and oversees large, long range, or multiple complex projects.
- Develops project scope, cost estimates, human resource requirements, work plans, time schedules, communication plans, and makes work assignments to meet project or program objectives.
- Establishes and monitors program priorities, objectives, and procedures, determining area objectives, targets of service, and resource needs allocation.
- Provides leadership and direction to the functional team so that tasks and activities are coordinated for project scope control, quality control, communication management, change control management, risk management and issue management.
- Develops, establishes, and oversees project prioritization process that contributes to the DTMB Call for Projects.
- Manages and oversees work request process.
- Aligns portfolio with client and DTMB strategic goals.
- Develops and maintains records, prepares reports, and composes correspondence relative to the work.

- Serves as a liaison between the DTMB and the customer/users concerning requests, standards, and other program and project matters.
- Coordinates work activities by scheduling staff assignments, setting the work priorities, and directing the work of assigned employees, (including contractual) in the development of new information technology systems and enhancements to existing systems.
- Provides input on project team member performance through the review of completed work assignments and work techniques.
- Identifies staff development and training needs and ensures that training is obtained, when necessary.
- Establishes configuration management practices that conform with SEM. Ensures that configuration audits are conducted.
- Utilizes established State standard system methods such as the State Unified Information Technology Environment (SUITE), Systems Engineering Methodology (SEM), and Project Management Methodology (PMM) in the maintenance, development, enhancement, and deployment of information technology systems.
- Directs or participates in the development of documents for service requests.
- Maintains awareness of emerging technologies and project management techniques.

There are three classification levels:

- First level - The employee serves as the information technology project manager of one or more small or medium or large projects. Projects typically have duration of less than 6 months and involve at least 10 team members.
- Second level - The employee provides leadership for a program (group of multiple related small or medium or large projects) or as the information technology project manager of one or more large, high risk, highly visible and highly complex projects. The employee may also function as the portfolio manager for a single agency or multiple small or standard agencies with information technology investments that include a mix of small, medium, and large projects. Projects typically have duration of 6 months-2 years with 20 or more team members.
- Third level - The employee serves as the information technology project manager of one or more programs or one or more extremely complicated, high risk and very large projects. The incumbent will provide leadership and direction to the project functional team so that tasks and activities are coordinated to integrate with each other and are in congruence with the project plans and schedules. As a matrix project leader, the incumbent provides direction to staff members in resolving technical/operational problems. The employee contributes to and advises on the available standards, methods, tools, and applications in project management disciplines and can make necessary decisions. The employee may also function as the portfolio manager for multiple complex agencies with combine investments that include a mix of small, medium, and large projects. The employee prioritizes and oversees a complex and diverse portfolio in order to maximize the agencies' investments in information technology. Projects/programs typically have duration greater than 2 years with 50 or more team members.

The State of Michigan has also established an IT project coordinator position, whose duties focus on technical assistance to the project manager. There are three classification levels.

- Information Technology Project Coordinator 9
- Information Technology Project Coordinator 11
- Information Technology Project Coordinator 12

Complete job specifications for the IT Project Manager and IT Project Coordinator are available on the Michigan Civil Service Commission website. A link to that site can be found in the resources and references section of this manual.

Successful project delivery requires assignment of a project manager with skills and experience that appropriately match the demands of the project.

2.7 Lessons Learned Review

It is an industry best practice not only to document lessons learned throughout the course of a project, but more importantly to review lessons learned from similar past projects before embarking on a new project. The project manager should review lessons learned of a project with similar scope prior to beginning work on the project charter. It may be necessary to consult with other project managers to obtain a full understanding of the lessons learned.

2.8 Project Charter

The first task that the recently assigned project manager must undertake is development of the project charter. The project charter formally initiates project activities. The charter provides a high level description of the project and initial project planning estimates. Distribution of the project charter marks the end of the initiation phase and serves as the basis for development of the project management plan.

Most of the information provided in the project request and available in the enterprise PPM tool should be copied to the project charter. In addition to basic information available in the project request, the charter provides more detail on the following topics:

- Agency goals and business needs – Information in the project request provides a good starting point. In collaboration with agency representatives, the project manager may choose to elaborate on the goals and needs that are key drivers for the project.
- High level project description – Again, the project request provides a good starting point. However, this section provides an opportunity to describe major project activities required to meet the business need.
- Measurable project objectives – Project objectives should tie to agency goals and business needs. Measurable project objectives are outcomes, milestones, or deliverables of major

project activities. In a general sense, an objective is a description of what will exist at the end of a project. Objectives should be SMART, as described in the table below.

Letter	Meaning/Purpose
S	Specific - Is the objective clear in terms of what, how, when, and where the situation will be changed?
M	Measurable - Are the targets measurable? For example, how much of an increase or reduction is desired? How many items should be produced, or how many people will be trained?
A	Action-oriented - Does the objective specifically state what actions are required to achieve the desired result? In some cases, the A refers to “attainable.” Is the objective something that can be reached by the performers?
R	Realistic - Are the desired results expressed in a way that the team will be motivated and believe that the required level of involvement will be obtained? Is the description accurate?
T	Time-bound - Does the objective reflect a time period in which it will be accomplished (e.g., end of the first quarter or by end of year)?

Table 2 SMART Objectives

- Project scope – Defines the work to be included (in scope), the work not included (out of scope), assumptions, and constraints.

The description of “in scope” work should be complete, but nonetheless concise. Examples include:

- Business requirements
- Application design
- Application development
- Quality assurance, including testing and usability evaluations
- Training
- Documentation
- Implementation
- Technology requirements / required

The description of “out of scope” work should clearly state the deliverables and activities that could be assumed by the customer to be part of the project, but in fact are not. Examples include:

- Hardware
- Software
- Operation services
- Maintenance and support

- For planning purposes an assumption is a factor considered to be true, real, or certain. This section provides the opportunity to document assumptions, such as:
 - The SUITE process will be used, including all touch points
 - If this project is an IT Investment Fund or MILAMP Project, the Benefits Realization tool will be used
 - If this projects requires a COTS solution, the COTS Guidebook will be used
 - If this project uses Agile methodology, the Agile process guide will be used
- A constraint is a restriction or limitation, either internal or external to the project, that will affect the performance of the project. This section provides the opportunity to document constraints, such as:
 - Schedule – project must be completed by a specific date in order to avoid financial penalties
 - Cost – funding is limited and cost overruns cannot be tolerated
 - Human Resources – system architect is available only in October
- Initial high level project planning - It is recognized that planning is an iterative process that becomes increasingly precise as detailed information becomes available. High level planning usually has a fairly large margin of error. Again, the project request information is a good place to start, but the charter provides an opportunity to provide additional detail and rationale for the following estimates:
 - Resource requirements, including the types and quantities of resources needed to perform the in scope work
 - Project budget, including the cost of resources (human, hardware, software, other products and services) to perform the in scope work
 - Benefits
 - Scheduling dates, including anticipated start date and target completion date
- Project authority - Most, if not all, projects require decisions to be made to keep the project on track. The project charter defines the authority of the individual or organization initiating the project, limitations or initial checkpoint of the authorization, management oversight of the project, and the authority of the project manager.
 - Approval authority – identifies the project initiator by name and title, ensuring that the individual has the authority to apply project resources, expend funds, make decisions, and give approvals.
 - Project manager - identifies the project manager by name and defines the individual's level of authority. A project manager should be given authority to plan, execute, and control the project. For example, the project manager may assign

resources in a matrix organization, authorize overtime, conduct staff performance appraisals, and take appropriate corrective actions that do not increase schedule or cost. However, scope changes must be escalated to the project sponsor.

- Oversight (steering) committee - describes agency management control over the project. Within the project, internal control should be established to control the day-to-day activities of the project. The project manager should manage internal control. External oversight should be established to ensure that the organization's resources are applied to meet the project and organization's objectives. Also identifies committee members and contact information.
- Approval information - At a minimum, the agency project sponsor, DTMB project sponsor, and project manager must sign the project charter. Large, complex, and highly visible projects also require active involvement and support of an executive sponsor.

2.9 Building Relationships

A project manager uses development of the project charter to engage key project team members, including sponsors, stakeholders, and other team members. Effective relationships and communication are probably the most valuable tools that a project manager develops and maintains. The project charter is an opportunity for a project manager to begin developing critical relationships and practicing effective communication. Project initiation is also an opportunity to begin development of the list of stakeholders and high level risks. These lists will be more thoroughly developed in the planning phase.

2.10 Establish Project Repository

Before exiting the project initiation phase, the project manager must establish a framework and repository for all project related documents. The State of Michigan uses Microsoft SharePoint as its standard document repository and collaboration tool. The PMO and EPMO set guidelines on folder structure.

CHAPTER 3.0 - PLANNING

3.1 The Planning Phase

Project planning follows project initiation and is often considered the most important phase in project management. Time spent up front identifying the needs and structure for organizing and managing a project saves countless hours of confusion and rework in the execution and control phases.

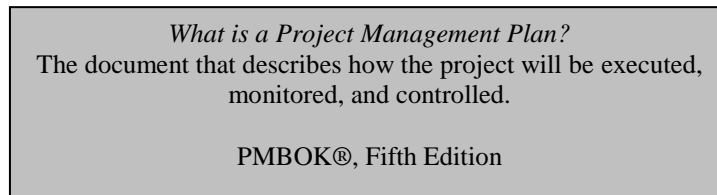


Figure 6 Project Management Plan

The purpose of the planning phase is to define the course of action necessary to accomplish project goals and objectives. This course of action is typically called a project management plan. It addresses all aspects of project management and includes scope, time, cost, quality, communications, human resources, risks, procurement, and stakeholder engagement. Development of the project management plan is iterative, as new information and changes occur throughout the project lifecycle, which require revisiting one or more components of the project management plan. Actual management of the project, which occurs in the execution and control phases, is the process of doing what was described in the project management plan.



Figure 7 Project Management Planning Phase

3.2 Project Planning Roles and Responsibilities

Everyone on the project team and, in most cases, several stakeholders play a part in planning a project. Key responsibilities for project planning are summarized below:

- Project managers are responsible for developing a project management plan for a specific project. The project manager is responsible for ensuring that the overall planning requirements are fulfilled. This includes delegation of responsibility for specific plan documentation as needed and obtaining appropriate approval signatures.

- Customers and other stakeholders are responsible for ensuring that the planning process is consistent with their organization's strategic business plan. All projects must be well thought out, support key stakeholder goals, and include documented processes that allow the project to be tracked and controlled until closure. Key customer stakeholders should be involved in review and approval of the project management plan.
- Resource managers are responsible for ensuring that there are adequate resources assigned to a project, including appropriate skills and numbers of both managerial and technical team members.

3.3 The Planning Process

Project planning is not a single activity or task. It is a process that takes time and attention. The project management plan is not merely the final deliverable itself, but more importantly a composite of all the activities, documents, and processes that come together to produce the product or service that results in that final deliverable.

Similarly, the intent of the SUITE project management methodology is to create a project management process that is sufficiently repeatable and stable for all agencies and their personnel to use. The process must be usable by people with many different backgrounds and from various functional areas. The planning process ensures that all necessary areas are considered

This same idea holds true on individual projects within the agencies. Project planning defines the project activities that will be performed, end products that will be produced, and describes how all these activities will be accomplished. For large and complex projects, it may be necessary to conduct a "plan for the plan" process that precedes development of the actual project management plan. The "plan for the plan" specifies the planning approach and brings together stakeholders that will contribute to the project management plan.

In PMP Exam Prep, Rita Mulcahy provides a comprehensive list of activities involved in project planning and suggests that they should be completed in the order listed below:

- Determine how you will do planning – part of all management plans
- Finalize requirements
- Create project scope statement
- Determine what to purchase
- Determine team
- Create work breakdown structure (WBS) and WBS dictionary
- Create activity list
- Create network diagram
- Estimate resource requirements
- Estimate time and cost

- Determine critical path
- Develop schedule
- Develop budget
- Determine quality standards, processes, and metrics
- Create process improvement plan
- Determine all roles and responsibilities
- Plan communications
- Perform risk identification, qualitative and quantitative risk analysis, and risk response planning
- Go back – iterations
- Prepare procurement documents
- Finalize the “how to execute and control” parts of all management plans
- Develop final project management plan and performance measurement baseline that are realistic
- Gain formal approval of the plan
- Hold kickoff meeting

3.4 The Project Management Plan

The project management plan provides a foundation for all management efforts associated with the project. Development of the project management plan begins after formal approval of the project charter, which indicates completion of the project initiation phase. The project management plan is a document that is expected to change over time.

The assigned project manager creates the project management plan. The plan should be as accurate and complete as possible without being several volumes in length. The SUITE project management methodology includes a project management plan that is sufficiently generic to be used with the vast majority of projects. The following table of contents is extracted from the SUITE project management plan:

A. Project Summary

1. Statement of Work
2. Project Deliverables
3. Project Approach
4. Project Results/Completion Criteria
5. Critical Success Factors

B. Project Schedule

1. Purpose
2. High Level Milestones
3. Detailed Schedule

C. Human Resource Management Plan

1. Purpose
2. Project Team Functional Roles
3. Project Team and Cost Estimates

D. Project Budget Estimate

1. Purpose
2. High Level Budget
3. Detailed Budget

E. Communication Management Plan

1. Purpose
2. Communication Matrix

F. Change Management Plan

1. Purpose
2. Change Management Roles and Responsibilities
3. Change Management Governance
4. Capturing and Monitoring Project Changes
5. Communicating Project Changes

G. Quality Management Plan

1. Purpose
2. Acceptance Criteria
3. Quality Assurance Activities
4. Project Monitoring and Control
5. Project Team Quality Responsibilities
6. SUITE Processes and Product Quality Assurance (PPQA) Reviews

H. Risk Management Plan

1. Purpose
2. Risk Identification Techniques
3. Risk Assumptions
4. Timeframes

5. Risk Ranking / Scoring Techniques
 6. Risk Thresholds
 7. Risk Response Approach and Risk Action Plan
 8. Risk Tracking Process
- I. Issue Management Plan
 1. Purpose
 2. Issue Log
 3. Relationships Among Issues, Risks and Change Requests
 - J. Approval Information

These areas are discussed in detail throughout the remainder of this chapter.

3.5 Project Summary

The project summary builds upon the project charter's high level project description, objectives, and scope and provides additional detail to ensure that all team members and stakeholders have a shared understanding of how the project will be managed. The project summary also provides the foundation for other components of the project management plan. The project summary includes:

- **Statement of Work**

The Statement of Work (SOW) is a narrative description of products or services, including high level project tasks and deliverables. It describes the tasks and deliverables in concise and measurable terms. It also includes the project timeline, quality requirements and any other noteworthy considerations.

- **Project Deliverables**

A deliverable is a measurable, tangible, verifiable outcome, result or item that must be produced to complete a project or part of a project. Note that the deliverables in this section provide more detail than the high level deliverables described in the SOW. Also note that deliverables are related to products or services and are not restricted to SUITE documents. Key deliverables must be approved by the agency and DTMB project sponsors.

- **Project Approach**

SUITE provides standard processes and forms for project management and system development. If a project requires modifications to the standard SUITE processes and forms, it

is important to describe the approach. For example, the project development methodology (e.g., Agile, COTS, prototype) may require tailoring of standard SUITE processes or possible automated tools will be used instead of SUITE standard forms (e.g., automated testing tools, automated requirements traceability). Additionally, other distinctive features such as whether the project is a phase of a larger effort or is integrated with other projects may be part of the overall project approach. Basically the project approach is used to describe any tailoring to the standard SUITE processes and forms.

- **Project Results/Completion Criteria**

Project results are completed and accepted deliverables. Project results may include outcomes (e.g., integrated systems, revised process, restructured organization, tests, trained staff, etc.) and documents (e.g., policies, plans, studies, procedures, specifications, reports). Completion criteria are explicit goals that must be attained to call an element of a project, or the entire project, "complete." Completion criteria may include formal acceptance of the product or service by the customer, signed approval of a deliverable by the project sponsor, completion of structured walkthroughs and stage exits, or customer acceptance of a system prototype.

- **Critical Success Factors**

Critical success factors include qualitative and quantitative factors that are key to the successful achievement of this project's objectives. Examples may include:

- Proper mix of expert resources
- Strong collaboration with key stakeholders
- Effective communications
- Strong alignment of project objectives with SOM strategic plan
- Executive support

3.6 Project Schedule

The project schedule is the roadmap for how the project will be executed. Schedules are an important part of any project as they provide the project team, sponsor and stakeholders a picture of the project's status at any given time.

- **High level milestones**

A milestone is an event with zero duration and requires no resources. A milestone is an event that receives special attention. It is used to measure the progress of a project and to signify the completion or start of a major deliverable or other significant metric. Note that milestones should map to project deliverables identified in the project summary section of this document.

- **Detailed Schedule**

A detailed schedule is developed, maintained and tracked in the enterprise Project Portfolio Management (PPM) tool. This electronic schedule constitutes the project work breakdown structure (WBS). Detailed information on project estimating and WBS development is included in the appendix.

3.7 Human Resource Management Plan

The purpose of the human resource management plan is to promote project success by ensuring the appropriate resources with the necessary skills are acquired.

- **Project Team Functional Roles**

The starting point for building a project team is identifying functional roles and responsibilities. A RACI chart is an effective and commonly used tool to define roles and then match degrees of responsibility to processes, phases, or activities. The following table shows key functional roles in a system development project throughout the project lifecycle.

Function (Role)	Initiation & Planning	Requirements Definition	Functional Design	System Design	Construction	Testing	Implementation
Sponsor							
Project Manager							
Business Analyst							
Technical Lead							
Security Liaison							
Enterprise Arch.							
Developer							
Tester							
Key: R = Responsible for completing the work (There must be an "R" for each column) A = Accountable for ensuring task completion/sign off C = Consulted before any decisions are made I = Informed of when an action/decision has been made							

Figure 8 Human Resource Management Plan

- **Identification of Required Skills and Available Staff**

Identification of available staff with the skills required to fill a specific functional role is critical to project success. The project manager, for example, makes assumptions about the skills of the

person performing a task. The skills of the people performing the work are directly related to the time that it takes to perform a task.

It is helpful in the planning process to develop a list of skills required, which may then be used to determine the type of personnel required for the task.

The project manager pragmatically assesses the skills of the available people on the project. The project manager's job is to determine the risks associated with the available skills and to build a plan that realistically accounts for those skills. People have varying degrees of skill, and the project manager needs to determine the level of schedule adjustment that should be made based on the staff skill level.

Where staff with the necessary skills is largely unavailable for assignment on the project, the project manager has several options: hire the necessary talent, contract services to perform the work, or provide training to increase the skill level of available staff. It is important that resources are properly trained if any gaps in skills are identified.

The purpose of training is to increase and hone the skills of the project team to improve project performance. Training can be both formal (taking classes in particular skill areas) and informal (receiving feedback from managers and team members). Project team members benefit professionally from learning new skills, and that benefit is returned to the project in the form of increased productivity and higher quality. Training is an element that should be considered early based on the skill needs of the project team, and funds should be allocated for training purposes.

Team building strategies are also clearly defined and team activities are effectively managed.

- **Project Team and Cost Estimates**

All project team human resources are entered in the enterprise PPM tool. This information is required for analyzing demand and capacity, running various "what if" scenarios and developing the budget estimate.

3.8 Project Budget Estimate

Like other aspects of planning, budget estimating is an iterative process. The initial budget estimate will be revised as requirements are refined and become better understood. In developing an initial high level budget estimate that is as reliable as possible, it is a best practice for the project manager to search the project repository for similar projects upon which to base this initial estimate. Further guidance on budget estimating is available in the Project Estimating Guide in the appendix. The following tables are consistent with budget data entered in the enterprise PPM tool.

- **High Level Budget**

	FY14	FY15	FY16
Costs (HW, SW, Contractor Deliverables, Client Agency Staff, other)			
Services (DTMB Staff & Contractor Staff Augmentation)			
Total			

Table 3 Project Budget High Level estimate

- **Detailed Budget**

Detailed baseline and actual budget information is entered, updated, monitored and reported through the enterprise PPM tool.

3.9 Communication Management Plan

Effective communication is a critical success factor for most projects. The purpose of the communication management plan is to set the communications framework that serves as a guide for communications throughout the life of the project. This plan is updated as communication needs change. This plan identifies and defines the roles of persons involved in the project.

After collecting information on the number and needs of the stakeholders involved with the project, it is the project manager's responsibility to draft a communication management plan that outlines the following:

- How information will be collected and updated. This section of the plan discusses how the project manager will collect information from certain project areas and how often updated information will be expected to be reported. It should also discuss what action will be taken if important information needs to be updated between project information collection cycles.
- How information will be controlled and distributed. This section of the plan provides a description of how project information will flow throughout the agency and who will make decisions on where information flows. This section also discusses which stakeholders and team members will have access to which particular areas of information. Information security policies should be referenced in the communication plan.
- How information will be stored. This section of the plan describes where project files will be kept within the agency as well as where electronic media might be stored for project team access.

It is recommended that the project manager maintain a separate project contact list.

- **Communication Matrix**

A communication matrix is a simple tool that provides quick reference for various components of the communication plan. Following is a sample communication matrix.

Type	Description / Purpose	Responsibility	Audience	Method	Frequency
Sponsor Status Meeting or Steering Committee	To discuss issues, change requests, issues, risks and overall status for the project that need to be known by Sponsors	Project Manager	Leadership Team	Group Meeting Email 4-Up Report	TBD
Project Management Status Report	To relay ongoing project status, list open issues, risks, milestones and accomplishments since last status	Project Manager	Project Sponsors Business Owner Stakeholders	PPM Tool Status Report is accessed online or is distributed by the PM via email	TBD
Stage Exit Meeting	To discuss successful completion of the SUITE SEM Stages and to receive approval to proceed to the next stage	Project Manager	See Role and Responsibility List Project Manager Project Sponsors PMO Representative DTMB Sponsor(s)	Group Meeting	End of each SUITE SEM Stage
Project Team Status Meeting	To discuss issues, change requests, issues, risks and overall project status	Project Manager	Project Team Members	Group Meeting Email	Weekly

Type	Description / Purpose	Responsibility	Audience	Method	Frequency
Project Technical Team Meeting	To discuss technical issues and activities for the project.	Technical Lead	Developers Project Manager (as needed) Other Resources (as needed)	Group Meeting Email	As needed
Agile Scrum	1. What I did yesterday 2. What I am working on today 3. What are my road blocks	Scrum Master	Project Team Members (technical and sponsors)	Brief stand-up meeting	Multiple times a week

Table 4 Sample Communication Matrix

3.10 Change Management Plan

The purpose of the change management plan is to describe the process involved with identifying, escalating and managing project changes. A project change is defined as something that is outside the documented and approved project scope or is a change to project requirements, project schedule or project cost (including resource effort). A project change requires approval for additional resources, funding or modifications to the project schedule. The change management process defines how to handle project changes that present either a negative or positive impact on deliverables, schedule, budget and/or resources. The enterprise PPM tool is the repository for all project changes.

- **Change Management Roles and Responsibilities**

- **Project Sponsor**

The project sponsor does not directly participate in change management activities, but serves as a point of escalation as required. The project sponsor has sole decision making authority to approve changes to the total project budget.

- **Project Manager**

The project manager is responsible for bringing change requests to the Change Control Board (CCB) for its review and decision making. Upon approval of a change request, the project manager is responsible for overseeing the change and making appropriate modifications to appropriate project documents.

- **Change Control Board**

The CCB meets on a regular basis to review, approve or reject proposed project changes. The project manager may convene a special session for the purpose of

reviewing a specific change request(s) as required. The makeup and formality of the CCB will depend on the size and complexity of the project.

- **Project Team Members**

Project team members are empowered to initiate change requests. Members serve as subject matter experts and are responsible for analyzing, documenting and estimating impacts of change requests on schedule, budget, resources, scope and quality.

- **Change Management Governance**

Objectives of the Change Management Process

- Accurately document and track all project issues, risks and change requests. Change requests often originate as unresolved issues or unmitigated risks
- Ensure review and action on change requests by the CCB
- Communicate decisions/resolutions to the appropriate stakeholders

- **Criteria for Review at CCB meetings**

If any of the following events occur, then the item should be brought forward for discussion at the next regularly scheduled or special CCB meeting:

- Changes to the approved project charter or project plan
- Changes or additions to milestones in the project schedule
- Changes to contract deliverables
- Changes to approved requirements or functional designs
- Increases to costs, including resource effort hours

- **Process Description**

Project changes are proposed in the form of a change request that has been entered in the enterprise PPM tool. Change requests are started by a Change Request Initiator who provides as much information as possible to document and initiate the request. The change request contains information such as brief description, impact, alternatives, detailed description, final recommendation and other pertinent information. The project manager assigns a Change Request Person Responsible as the “owner” of the change request, who is responsible for gathering project impacts with regard to project costs and the project schedule.

The Change Request Person Responsible researches the requirements and impact of the change. This information is reviewed by the project manager and subject matter experts to assess the change request feasibility and to identify potential issues. This information is communicated and discussed at the CCB meeting in which a decision is made to approve or reject the change. Upon CCB approval, the project manager incorporates the change(s) into the existing schedule for tracking and management. The project manager documents the

status of the change request and maintains a log of all decisions. Note that the Enterprise PPM tool supports the change request process.

- **Change Request Steps and Actions**

Step	Action	Responsibility / Agent
1.	Identify and document change requests	Change Request Initiator
2.	Assign Change Request Person Responsible	Project Manager
3.	Collect and document project impacts, including changes to costs and schedule	Change Request Person Responsible
4.	Validate change requests in the Enterprise PPM tool	Project Manager
5.	Review change request details for feasibility	Project Manager
6.	Facilitate CCB review / make decision	Project Manager/CCB Members
7.	Communicate decision and closure	Project Manager
8.	Update appropriate schedules and documents	Project Manager
9.	Update status and close change request	Project Manager

Table 5 Change Request Steps and Actions

- **Capturing and Monitoring Project Changes**

The project manager and CCB members will strive to limit project changes, always keeping in mind that quality and relevance of deliverables are key elements of success. As indicated above, the enterprise PPM tool is the repository for all project changes.

Note that the DTMB Enterprise Change Control Process must be followed for all changes to any application production environment. Details of this process are outside the scope of this document. Please refer to DTMB Technical Standard 1370.00.01.

- **Communicating Project Changes**

CCB meeting minutes, including decisions related to change requests, are circulated to project sponsors and State executives. Project team members will be notified by e-mail regarding the disposition of change requests.

3.11 Quality Management Plan

The purpose of the quality management plan is to describe how quality of the project will be managed throughout the lifecycle of the project. It also includes the processes and procedures for ensuring quality planning, assurance and control processes are all conducted. All stakeholders should be familiar with how project quality will be planned, assured, and controlled. The quality management plan establishes the activities, processes and procedures for ensuring a quality product is delivered upon the conclusion of the project. The purpose of this plan is to:

- Ensure quality is planned
- Define how quality will be managed
- Define quality assurance activities
- Define quality control activities
- Define acceptable quality standards

- **Acceptance Criteria**

The SUITE Systems Engineering Methodology (SEM) provides “stage exits” or points in time during the project when the customer and stakeholders will review the deliverables in detail and accept or reject the work (or accept with noted revisions). Every effort will be made to identify all stakeholders and plan for their participation in the acceptance process. Each stage of the SEM is planned, documented and reviewed by all applicable stakeholders. Each deliverable will be reviewed and approved, if required, before proceeding to the next stage. Stage exits will be conducted at the end of each SEM or PMM stage.

- **Quality Assurance Activities**

SEM processes will be used to monitor and control quality on this project. The SEM provides for seven stages, each with required documentation, reviews and approvals. The stages will be executed and monitored during the project.

The quality of the project outcome depends upon the quality of these plans, documents and knowledge transfer phases. Their quality is ensured by walkthrough reviews done by knowledgeable and invested stakeholders. A formal change control process will be followed for modifications required to documents that have been reviewed and approved. PMM and SEM documents will be stored in the Enterprise Solution Tool (i.e., SharePoint).

The project will use verification, validation and structured walkthrough techniques to promote quality in deliverables.

- **Verification**

The objective of verification is to make sure that a deliverable is correctly derived from the inputs to the stage that creates it, is internally consistent, and conforms to standards. The verification of a specification deliverable identifies errors in that deliverable before they are passed on to the next stage of development. The resulting benefit is that errors are caught early in the development process where they can be addressed with a minimum of effort, rather than during testing where correcting errors becomes more costly. Verification is the process of checking that a deliverable is correctly derived from the inputs and is in the correct format, while testing makes sure that the specification was properly implemented.

The purpose of these activities is to:

- Evaluate a deliverable against appropriate project standards
- Identify and correct defects as early in the process as possible
- Reduce the number of Remedy Tickets and Change Controls (CCs) as the work effort progresses
- Reduce time and costs that result from rework

- **Validation**

Validation uses techniques similar to verification (e.g., testing, analysis, simulation) and covers hardware and software. Validation can be done by analyzing a model of the implementation, by creating and testing a prototype (performing a usability test to validate if user interface requirements are met) or by conducting a peer or expert review (as in validating the design for maintainability).

- **Structured Walkthroughs**

Deliverables are also monitored and controlled for quality through a process known as a Structured Walkthrough. The Structured Walkthrough process is used to identify and correct errors early in the development process by evaluating a deliverable according to SUITE guidelines and project standards. A Structured Walkthrough can be formal (meeting with a facilitator to guide the process) or informal (document reviewers email their comments to a scribe who will compile the results). This process is intended to reduce the number of problems and warranty issues, as well as reduce the time and costs resulting from rework. The purpose of the Structured Walkthrough feedback form is to document peer review findings which include the following:

- Action Items
- Errors
- Issues/Risks
- Suggestions/Omissions

Deliverables are reviewed for quality in terms of the following criteria (as applicable):

- Clarity
- Contractual concerns
- Functional content and accuracy
- Performance impact
- Project standards/format
- Scope
- Technical content
- Value/benefit to the client

The following table illustrates the criteria used in determining the type of Structured Walkthrough and the intended audience:

Structured Walkthrough Guidelines

Work Product	Review Type	Suggested Reviewers	Relevant Documents
Business Requirements	Always formal regardless of size/hours	Assigned Developer Business Lead Lead Developer Project Manager	Business Requirement Document Relevant Supporting Documentation
Technical Requirements	Always Formal regardless of size/hours	Assigned Developer Business Lead Lead Developer Project Manager	Business Requirement Document Relevant Supporting Documentation
Functional Design (FDSN)	Always Formal regardless of size/hours	Assigned Developer Business Lead Lead Developer Project Manager	FDSN Relevant Supporting Documentation
Technical Design (TDSN)	Formal if Construction/Unit Test tasks total > 40 hours, otherwise Informal	Architect Assigned Developer DBA Lead Developer Project Manager	TDSN Relevant Supporting Documentation
Source Code, Unit Test Plan, Unit Test Scenarios and Test Results	Formal if Construction/Unit Test tasks total > 40 hours, otherwise Informal	Architect Assigned Developer DBA Lead Developer Project Manager	Source Code and Unit Test Plan, Unit Test Scenarios and Unit Test Results
System Test Plan and Test Results	Formal if Test Condition/Script	Architect Assigned Developer	System Test Plan, System Test Scenarios

Work Product	Review Type	Suggested Reviewers	Relevant Documents
	Writing tasks total > 60 hours, otherwise Informal	DBA Lead Developer Project Manager	and System Test Results

Table 6 Structured Walkthrough Guidelines

If a document or deliverable is not listed here, then the project manager will make a determination on how to conduct the review. All listed work products must be reviewed.

It should be noted that structured walkthroughs occur more frequently when Agile methods are used, and that multiple work products may be in active development at the same time (e.g., Functional Design and Technical Design). Refer to the DTMB Agile Process Guide for more details.

Monitoring and controlling project quality will be done via:

- The structured walkthrough review and approval process performed for every deliverable of the project as documented in the project schedule
- Weekly review of tasks, risks, schedule and issues with the project team
- Escalation process will be followed (documented in the Project Roles and Responsibility Document) when project milestones will be missed
- Escalation of risks where needed using the project governance model

• **Project Team Quality Responsibilities**

Quality is a shared responsibility of all project stakeholders. Quality is not just a review at the completion of a deliverable. Quality is built into the project from the beginning by support from stakeholders as each phase of the project is executed. Appropriate stakeholders will participate in the creation and/or review of all deliverables.

• **Project Quality Assurance (PQA) Reviews**

The DTMB PQA team provides objective project quality reviews to ensure compliance with SUITE processes, methodologies, and CMMI best practices. The PQA teams attempts to review at least one project per customer agency per year.

3.12 Risk Management Plan

The purpose of the risk management plan is to specify the processes used to identify and manage risk. The risk management plan addresses both internal and external project risks associated with the

project, and is drafted prior to completion of the project planning phase. Both the risk management plan and the risk log will be regularly reviewed throughout the project to monitor existing risks and to identify new ones.

The project manager is responsible for facilitating sessions with project stakeholders to identify risks. A risk owner is assigned to each risk, with responsibility for developing, documenting and executing risk action plans. The project manager is responsible for monitoring the status of all project risks and escalating as appropriate.

The enterprise PPM tool supports the risk management process, including the risk log.

Risk Identification Techniques

Project risks can be identified by using one or more of the following techniques:

Technique	Description
Interviews	Interview relevant project stakeholders to identify their concerns, which may provide insight into real project risks.
Risk brainstorming workshops	Conduct risk brainstorming workshops with relevant project stakeholders to identify risks, including key risk influencers, risk levels, and possible impacts.
SWOT analysis	Conduct a strengths, weaknesses, opportunities, and threats (SWOT) analysis to gain a holistic view of the project with respect to risk. Threats are project risks Opportunities represent lost potential benefits if not pursued Weaknesses, if not properly mitigated, can negatively impact a project Strengths should be leveraged to help the project mitigate the identified project threats
Process reviews	Identify process-related risks by reviewing the various project management processes, tools, and techniques described in the Quality Management Plan.
Previous project reviews	Identify risks from previous projects of similar size and complexity, using available project data and lessons learned.

Table 7 Risk Identification Techniques

Risk Assumptions

Risks are events or conditions that may occur, and whose occurrence, if it does take place, has a positive or negative effect on the project. Exposure to the consequences of uncertainty constitutes a risk. Although by definition risk management may include risks that will have a positive impact on the project, the focus is typically on risks that may negatively impact the project.

Difference between risks and issues: If something is definitely going to happen or has happened, then it is an issue. If it is something that might happen, whether that is very likely or very unlikely, then it is a risk.

The table below lists and describes the standard risk types that are used to categorize project risks.

Risk Type	Risk Type Description
External	Any risk related to environmental factors largely outside the control of the project (such as cultural, legal or regulatory).
Financial	Any risk related to the budget or cost structure of the project (such as increase or decrease in the project-related budget).
Functional	Any risk related to the overall function of the product (such as requirements or design) being developed by the project.
Quality	Any risk related to the quality requirements of the project.
Organization	Any risk related to internal, client, organizational or business changes (such as executive leadership role changes).
Performance	Any risk associated with the performance of the application (such as response time, stress testing and development environments).
Project management	Any risk related to the management of the project (such as communications, status reporting and issues management).
Resource	Any risk related to project resources (such as the addition or removal of resources).
Schedule	Any risk related to the Project Work Plan and related tasks (such as extensions or reductions of the project timeline).
Scope	Any risk related to project scope (such as process, module and development objects).
Technical	Any risk related to software or hardware, including infrastructure related to the project.
General	Any risk that cannot be categorized into one of the above categories.

Table 8 Standard Risk Types

Timeframes

The Risk Management Plan will be followed throughout the course of the project. Risks will be reviewed in project meetings (refer to Communication Plan in section G) as needed.

Risk Ranking / Scoring Techniques

The following tables represent the risk impact/probability matrix used to internally score the risks for the purpose of prioritization. The resulting product from multiplying risk probability and impact determines the severity rating (score) of the risk. The higher the risk score the more important it is that the risk is managed.

Impact		Probability				
		1-Low	2-Low/Medium	3-Medium	4-Medium/High	5-High
	5-High	Low (5)	Medium (10)	High (15)	High (20)	High (25)
	4-Medium/High	Low (4)	Medium (8)	Medium (12)	High (16)	High (20)
	3-Medium	Low (3)	Medium (6)	Medium (9)	Medium (12)	High (15)
	2-Low/Medium	Low (2)	Low (4)	Medium (6)	Medium (8)	Medium (10)
	1-Low	Low (1)	Low (2)	Low (3)	Low (4)	Low (5)

Score	Severity
1-5	Low
6-12	Medium
13-25	High

Figure 9 Risk/Impact Probability Matrix

The risk response matrix below should be used to consider the appropriate action required for a risk in relation to its impact / likelihood. Guidance on the review periods for each level of risk are the minimum level of review required, but certain risks might warrant more regular reviews.

Impact	High	3	Implement Further Actions to Reduce Risk; Continue Existing Controls; Generate Contingency Plan; Review at least every 2 weeks	Urgently Take Further Remedial Action to Reduce Risk; Contingency plan on standby; Review at least every week	Take Immediate Further Remedial Action to Reduce Risk; Contingency plan on standby; Review Continuously
	2		Tolerate; Continue existing Control Measures; Possible Contingency Plan; Review at least 2 weeks	Implement Further Actions to Reduce Risk; Continue Existing Controls; Generate Contingency Plan; Review at least every 2 weeks	Urgently Take Further Remedial Action to Reduce Risk; Contingency plan on standby; Review at least every week
	Low	1	Tolerate; No action: Continue Control if Required; Review at least monthly	Tolerate; Continue existing Control Measures; Possible Contingency Plan; Review at least 2 weeks	Implement Further Actions to Reduce Risk; Continue Existing Controls; Generate Contingency Plan; Review at least every 2 weeks
			1 Low	2 Probability	3 High

Figure 10 Risk Response Matrix

Severity Rating	Assessment of Severity/Risk Rating Description	Ranking
High	Significant impact on project baselines	3
Medium	Controllable impact on cost, schedule and performance	2
Low	Minor impact on cost, schedule and performance	1

Table 9 Assessment of Risk Severity/Rating Descriptions

Risk Thresholds

A risk response plan must be developed for all risks that are scored as “high.” Key stakeholders and the project manager will determine which, if any, risks that scored as “medium” require a risk response plan.

Risk Response Approach and Risk Action Plan

A risk response approach is identified for each risk. A risk action plan is developed as appropriate to support the risk response approach.

Risk Avoidance

The goal of risk avoidance is to eliminate the risk or threat entirely. Risk avoidance usually involves modification of the project management plan by extending the schedule, changing the strategy, or reducing scope. However, it is difficult to completely avoid or eliminate a risk, and one of the following three risk response approaches is typically used.

Risk Transference

Transferring a risk does not eliminate the risk. Transferring gives another party responsibility for the risk management.

Risk Mitigation

Action should be taken as early as possible to reduce the probability of a risk's occurrence and its impact to the project. For risk mitigation to occur, the project assesses mitigation costs, which must be appropriate given the probability of the risk and its consequences. Mitigation alternatives may include implementing procedures that will reduce the problem, such as utilizing less complex processes, conducting more specific or regressive testing or ensuring appropriate parties review work (such as using peer reviews). Mitigation may also involve adding resources or time to the project plan.

Risk Acceptance

Acceptance indicates that the project team has decided not to change any plans to mitigate the risk. When accepting risk, the project team will develop a risk action plan in order to reduce the consequences should the risk event occur.

Risk Action Plan

The risk action plan includes the agreed-upon specific actions that will be taken to implement the chosen response strategy, budget and times for responses, contingency or fallback plans, and the level of residual risk expected to remain after the strategy is implemented.

A decision must be made at the time of a risk triggering event to determine the appropriate response. The decision will be on a case-by-case basis, based on the nature and timing of the event.

Risk Tracking Process

Once risks and their associated response plans have been vetted (i.e., identified, assessed and reviewed) by key stakeholders and managers, they are entered into the risk log so that they can be effectively managed, responded to and reported on.

The project manager will monitor for new risks and changes to identified risks, in an effort to proactively mitigate risks. Existing project risks may be closed for the following reasons: the event that could have triggered the risk no longer exists; the mitigation plan to address the risk has been completed successfully; or the risk event has already been triggered, therefore the risk has now become an issue.

3.13 Issue Management Plan

The purpose of the issue management plan is to specify the processes used to identify and manage project issues. The issue management plan addresses both internal and external issues on the project. The enterprise PPM tool is used to enter, track and report issue activity. Both the issue management plan and the issue log will be reviewed regularly throughout the project to monitor existing issues and to identify new ones.

Issue Log

The issue log is used throughout a project's lifecycle to capture any issues brought forward, communicate the issues to the project team and stakeholders, establish categories and priorities of all issues, assign responsibility to each issue, and to ensure that each issue is resolved with minimal impact to the project's performance. Like most other project documentation, the issue log will be reviewed by the project team regularly to ensure that issues are being resolved. The document should be updated and communicated to all appropriate project stakeholders as updates are made.

Relationships among Issues, Risks and Change Requests

Issues are events that are occurring now or have already occurred. An issue is not an event or item that may occur at a time in the future. If something is definitely going to happen or it has already happened, then it is an issue. If it is something that might happen - whether it is very likely or very unlikely - then it is a risk. An issue can turn into a risk and a risk may result from an issue. An issue can be associated to a risk. Prompt issue resolution can minimize project changes.

Review and Approval Process

Once the project manager completes the project management plan, a SUITE structured walkthrough should be conducted among key contributors to the plan. When key contributors are satisfied and have accepted the plan, then the project manager should present it for review and discussion to key stakeholders, including customers and sponsors. Once the project management plan is approved and signed by sponsors and representatives from Enterprise Architecture and Michigan Cyber Security the project manager is given authority to move the project into the execution phase.

Other Considerations

The SUITE methodology includes touch points to processes developed and controlled by specific organizational units within DTMB. SUITE touch points include:

- Systems Engineering Methodology (SEM) Lifecycle Stages
- Enterprise Architecture
- Infrastructure Services Request Process
- Procurement
- Security Assessment and Plan

- Look and Feel / ADA Review
- Usability and User Design
- Disaster Recovery Planning

Procurement Management Plan

The procurement management plan covers those instances in which it is necessary for the State to purchase products or services needed to deliver the project. In these cases, the policies and procedures defined by the DTMB Office of Procurement govern all procurement activities, including:

- Development of a Statement of Work
- Types of contracts available
- Risk management processes
- Standard procurement documents
- Evaluation criteria
- Coordination of procurement with other projects
- Constraints and assumptions that could affect the desired procurement
- Establishing timeframes for the procurement
- Provision of standard language for contract terms and conditions
- Identification of prequalified vendors, if applicable
- Metrics to be used for managing contracts and evaluating vendors

Although the project manager does not directly manage procurement and contracting activities, it is still important that the project manager have a fundamental understanding of DTMB procurement and contracting policies and procedures.

The project manager must incorporate procurement activities into the overall project management plan and address impacts on schedule, budget, human resources, communication, change management, quality management, risk management, and issue management. During the execution phase, the project manager is directly responsible for ensuring that vendors meet the agreements specified in their contract and for monitoring and controlling vendor performance.

CHAPTER 4.0 - EXECUTION

4.1 The Execution Phase

Project execution begins immediately after the project management plan is approved by the project sponsors. The execution phase essentially involves carrying out and managing all the activities described in the project management plan.

The Executing Process Group consists of those processes performed to complete the work defined in the project management plan to satisfy the project specifications. This process group involves coordinating people and resources, managing stakeholder expectations, as well as integrating and performing the activities of the project in accordance with the project management plan.

PMBOK®, Fifth Edition

Figure 11 The Executing Process Group

The first step in project execution is to establish a baseline for the project management plan. A baseline is the approved version of the plan that can be changed only through the documented change management process. Most projects involve changes, which often require re-planning and re-baselining. It is not unusual for changes to occur in resource productivity and availability, expected activity durations, and unanticipated risks. These changes may in turn require changes in the project schedule and project budget. The enterprise PPM tool supports the change request and approval process.

Although monitoring and controlling is depicted as a distinct phase in the project management methodology, it actually spans all phases of the project. However, the majority of the monitoring and controlling effort is during the execution phase. Project managers monitor and control all phases of a project, with execution probably receiving the closest scrutiny. For example, project status reporting not only provides information on execution of project activities but also is a component of the communication and stakeholder management plans.

Project Management Execution Phase



Figure 12 Project Management Execution Phase

4.2 Project Execution Roles and Responsibilities

Various project roles and responsibilities are documented and approved in the human resource section of the project management plan in a RACI chart. The activity level of various functional roles varies depending on the project life cycle. The human resource section also includes a roster of team members and their assignments for executing project activities.

- Project managers are active and highly visible during project execution, particularly in large projects where sponsors, executive management, and other stakeholders expect to see and discuss deliverables and activities described in the project management plan. Most project managers spend a large percentage of their time executing the communication plan.

In addition to keeping stakeholders up to date with project status, project managers must also deal with procurement and contract administration issues, ensure effective project quality processes are used, and monitor project risk. While the processes to control many of these elements are discussed within the project monitoring and controlling phase, it is important that a project manager be cognizant of the issues as the project is being performed. Daily interaction and feedback from team members is vital to project success.

- The project quality assurance (PQA) team evaluates overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards. While it is important that each team member be responsible for the quality execution of tasks, a quality team plays an integral role in the execution of quality throughout the project. This team ensures that the quality plan is executed.
- Project team members are expected to perform their assigned tasks in a timely and quality manner. They are also expected to provide regular status updates to the project manager and enter data as required in the enterprise PPM tool to facilitate schedule and budget analysis.

4.3 Executing and Updating the Project Management Plan

The Project Status Reporting Process

A standard requirement of all projects is to provide status information to both executive management and the project team. Weekly project status reports are automatically generated based on data available in the enterprise PPM tool. A standard format is used for all project status reports, which are widely available on the Enterprise Portfolio Management Office's project dashboard. Projects are grouped in various portfolios, and it is possible for a project to be included in more than one portfolio.

Status reporting is an integral part of the project management process. It is the means by which the project team, contractors, and executive management stay informed about the progress and key activities required to successfully complete the project. The purpose of the Status Report, and more importantly collection and discussion of data that feed the report, is to provide information on the progress of the project, identify issues and risks that must be resolved, and to implement changes as appropriate.

The project team provides input to the weekly status report including time logged to assigned tasks and activities, accomplishments, milestones, identified issues.

Project Name: ICT - Enhance Project Management

Project Manager: Virginia Hambric

Project Status: Green

Key Milestone	Baseline Finish	Planned Finish	Actual Finish	Status
Finalize project charter	12/31/2012	12/31/2012	12/31/2012	Completed
Improve PMM forms	5/16/2013	5/16/2013	5/30/2013	Completed
Publish final PMM forms package and overview diagrams	5/16/2013	5/16/2013	5/30/2013	Completed
Develop and implement communication plan	5/15/2013	5/15/2013	5/21/2013	Completed
Develop and implement training plan	5/15/2013	5/15/2013	5/21/2013	Completed
Update PPQA review process	6/15/2013	6/15/2013	6/12/2013	Completed
Develop and publish Project Estimating Guide		8/30/2013	8/23/2013	Completed
Update and publish PMM key terms, definitions, and acronyms		8/30/2013	8/23/2013	Completed
Develop SUITE 101 workshop on project estimating		11/30/2013	11/26/2013	Completed
Update PMM manual and related documents	3/31/2014	3/31/2014		GREEN
Project Completion	4/30/2014	4/30/2014		GREEN

Current Activity Status

Development of a SUITE 101 workshop on project estimating was completed on Nov. 26. The workshop includes both a PowerPoint presentation and an interactive exercise. A "dry run" is scheduled for Dec. 20. After making any necessary revisions, the workshop will be added to the SUITE 101 schedule and offered at least three times during 2014.

Work to update the PMM manual and related documents is in progress. The manual was last revised in 2004 and considerable re-writing is necessary to incorporate new processes and automated methods. The team is on target for completion at the end of March 2014.

Project Budget / Cost

Initial Budgeted Cost	Latest Revision Budgeted Cost	Actual Cost To Date
\$81,180.00	\$81,180.00	\$47,880.00

No Budget Comments

Key Executive Issues

No Key Issues Identified

Key Executive Risks

No Key Risks Identified

Major Project Accomplishments

Developed SUITE 101 workshop on project estimating, including both a PowerPoint presentation and an interactive exercise.

Next Steps

Conduct "dry run" of the new Project Estimating workshop on Dec. 20. Audience includes SUITE 101 workshop instructors and PMO Managers.

Revise project estimating workshop as needed based on feedback from the dry run. Add the new workshop to the SUITE 101 schedule beginning in January 2014.

Figure 13 Project Status Report

4.4 Using Status Reviews for Information Distribution

The project communication management plan is an important factor in the execution phase. A large part of a project manager's responsibility during execution is keeping stakeholders informed of project status. Joint project reviews are a good way to bring visibility to all areas of the project. They provide an opportunity to discuss important issues and make management decisions on the project with input from several sources. Joint project reviews can involve the project manager, project team members, sponsors, and other project stakeholders, depending on the issues being discussed. The frequency and topics covered at these meetings should be outlined in the communication management plan.

4.5 Benefits of Status Reviews

Examples of benefits of joint status review meetings include the following:

- Visibility of accomplishments, issues, and risks is vital. Joint reviews allow all interested parties to acknowledge milestones and accomplishments as well as to review and resolve issues and risks. Joint reviews also make team members feel more responsible for getting the work done.
- Stakeholders must agree on the outcome (e.g., approval, disapproval, contingent approval) of the review and any action items as a result of the review. The best way to reach agreement is to get stakeholders together in a formalized, planned manner.

4.6 Schedule Data Collection and Validation

Updating schedules to depict current work effort is key to ensuring that accurate schedules are maintained. Without standard procedures, invalid data may cause inaccurate schedule performance reporting. Data collection and validation involves the following steps:

- Collecting and validating schedule status; for example, data that reflects start, finish, and estimates to complete work.
- Validating data attributes and associations used to report schedule information; for example, task relation to the work breakdown structure, project phase, functional organization, or integrated master schedule.
- Validating work effort to ensure that the schedules accurately depict the way work is being accomplished and reported.

The enterprise PPM tool supports time entry and schedule management.

4.7 Executing the Risk Management Plan

The enterprise PPM tool supports the risk management process. Executing the risk management section of the project management plan is critical for successfully completing a project. Risk identification, ranking/scoring, identification of risk responses, and development of a risk action plan were completed in the project planning phase and documented in the project management plan. Executing the plan and tracking risks are key elements of the project execution phase.

Assignment of a risk manager is highly recommended, particularly for large and complex projects. It is acceptable for the project manager to function as the risk manager for small to medium size projects. This assignment should be made no later than the time at which the project management plan is baselined. The risk manager or project manager is responsible for:

- Including a risk summary in the regular status meetings
- Providing a consistent and ongoing evaluation of risk items and development of risk strategies:
 - Identifying the risk
 - Evaluating the risk
 - Defining a resolution strategy

As a project moves through the various project management phases, the ability to define and specify the risk items increases. This is because more is known about the project and the associated issues.

During the execution phase, risks become better defined and tangible resolution strategies emerge. This allows for the development of realistic contingency plans, including specific action plans. These

actions must then be tracked. The risk management section of the project management plan may need to reflect these activities.

Risk management is an iterative process that is performed throughout the project. Risk management examines a risk and its potential impact on the project and defines actions to eliminate or to mitigate the impact of that risk, should it occur. The process starts with the risks identified in the project management plan and the initial risk response approaches. There are typically four types of resolution strategies:

- Eliminating or avoiding the specific threat, usually by eliminating the cause. The project team can never eliminate all risk, but specific risk events can often be avoided through careful planning.
- Mitigating a risk means taking action as early as possible to reduce the probability of a risk's occurrence and its impact to the project. For risk mitigation to occur, the project assesses mitigation costs, which must be appropriate given the probability of the risk and its consequences. Mitigation alternatives may include implementing procedures that will reduce the problem, such as utilizing less complex processes, conducting more specific or regressive testing or ensuring appropriate parties review work (such as using peer reviews). Mitigation may also involve adding resources or time to the project plan.
- Transferring a risk does not eliminate the risk, but gives another party responsibility for the risk management via insurance, negotiation, with key stakeholders, or by other means.
- Acceptance indicates that the project team has decided not to change any plans to mitigate the risk. When accepting risk, the project team will develop a risk action plan in order to reduce the consequences should the risk event occur.

Executing the risk management process, which is defined in the risk management section of the project management plan, is a cyclical and iterative process, including four overlapping steps:

- Risk Identification
- Qualitative and Quantitative Risk Analysis
- Risk Response Planning
- Risk Monitoring and Control

4.8 Risk Manager

Execution of the risk management process is assigned in the planning phase and documented in the project management plan. The risk manager is responsible for ensuring that risk management is performed throughout the project. This person may be the project manager, although in most large projects this is not the most advisable approach. It is primarily a workload issue.

During the project planning phase, risk management functions may be performed by the project manager. In the executive phase, risk management may require a separate (full-or part-time) position to handle the workload.

The risk manager should:

- Have enough seniority in the project organization structure to request that specific risk contingency plans be assigned and staffed
- Attend project management status meetings
- Have an understanding of the overall project

The identity of the risk manager should be publicly announced and should also be reflected in the organizational breakdown structure. In most cases, the risk manager will also fulfill another management or lead technical role on the project team.

4.9 Risk Meetings

Risk management is a process that involves all members of the project team and occurs throughout all project management phases. Risk meetings are part of, and contribute to, the process of identifying risks and developing ways to approach the risks. These are especially helpful on high-risk or complex projects.

- Risk Identification Meetings. It is during this process that the current risk list is reviewed and updated.
- Executive Review Meetings. A summary of the top risk items for the project is included in the executive project review meeting. The summary should be no more than one page in length and should list the risk, state the defined resolution, and indicate the current status.
- Project Status Meetings. On a regular basis, the individual responsible for risk should report to the project status group on the current status of project risk. There should be a summary document including information on all contingency plans currently under way.

4.10 Ongoing Risk Identification

The initial list of risks that begins with the project will evolve over time. Risk identification meetings should be held to ensure that new risks are added and resolved risks are eliminated. Meeting frequency

is based on the size of the project and the perspective of the project team and key stakeholders about the degree of risk that exists for the full project.

The meeting format should be open and interactive to facilitate a wide consideration of risk areas.

Some suggestions on meeting format include the following:

- Brainstorming
- Breakout sessions
- Other meeting approaches that encourage the free flow of information

The starting point for a risk identification meeting is the previous risk list. Additionally, some general areas should be considered. The group should be given some ground rules in terms of the degree of risks that will be tracked and ways to eliminate or include risk items. Some criteria for risk tracking include time frame (when it would possibly occur) and value (what would be the cost if it occurred). The risk manager should provide this information to the group. From this meeting, the risk manager will have an updated list of risks. The group assists in the process of prioritizing the risks by determining the probability of their occurrence and the impact these risks could have on the project. Specific procedures for risk management are defined by the project manager, risk manager, and project team.

Note: *Current problems are not to be considered, as these are issues for the change and issue management process.*

4.11 Historical Record

The enterprise PPM tool maintains a risk log and historical record of risk management activities. This information can be used as lessons learned, and the project team can benefit from reviewing past risks and occurrences.

4.12 Executing the Procurement Management Plan

The procurement section of the project management plan covers those instances in which it is necessary for the State to purchase products or services needed to deliver the project. In these cases, the policies and procedures defined by the DTMB Office of Procurement govern all procurement activities. The project manager's responsibility in the execution phase includes executing the procurement plan as well as managing vendor activities after a contract is awarded and finalized. Project manager is also responsible for providing input into new product requirements for the services or products that were not included in the project management plan. In addition, the project manager is responsible for ensuring that vendors, once contracted to do the work, meet the contractual agreements specified within their contracts. Project managers are also be responsible for tracking, reviewing, and analyzing the performance of contractors on a project. This performance reporting is the basis for any contractual changes that need to be made during the life of the contract. Finally, project managers play an important role in oversight and review of any contract changes that will affect the project.

4.13 Changes to the Project Management Plan

During the execution phase, the project management plan is implemented and modified as necessary. Updates to the plan may result from such things as:

- New estimates of work still to be done (generated as more detailed information is known about outstanding work)
- Changes in scope/functionality of end product(s)
- Resource changes
- Unforeseen circumstances

All changes to the approved and baselined project management plan must follow the change request and approval process.

CHAPTER 5.0 - MONITORING AND CONTROLLING

5.1 The Monitoring and Controlling Phase

Project monitoring and controlling spans all phases of the project management methodology, beginning with initiation and ending with closing.

The Monitoring and Controlling Process Group consists of those processes required to track, review, and orchestrate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes. The key benefit of this process group is that project performance is measured and analyzed at regular intervals, appropriate events, or exception conditions to identify variances from the project management plan. The Monitoring and Controlling Process Group also involves:

- Controlling changes and recommending corrective or preventive action in anticipation of possible problems,
- Monitoring the ongoing project activities against the project management plan and the project performance measurement baseline, and
- Influencing the factors that could circumvent integrated change control or configuration management so only approved changes are implemented.

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Figure 14 Monitoring and Controlling Process Group

Project execution essentially involves carrying out and managing all the activities described in the project management plan. Monitoring and controlling basically means collecting project performance data, comparing planned and actual performance, analyzing variances and trends, identifying and assessing potential process improvements, and recommending corrective action as needed. Monitoring and controlling is critical for overall project success.

Project Management Monitoring and Controlling Phase

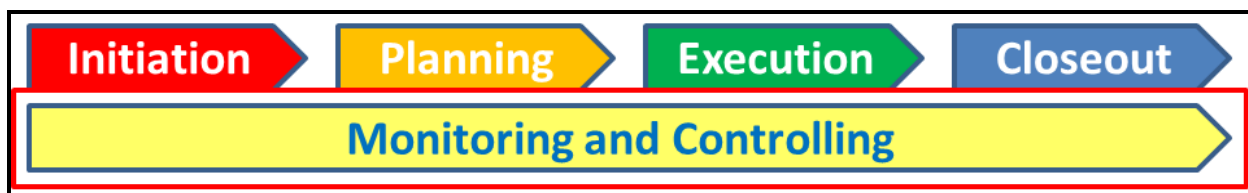


Figure 15 Project Management Monitoring and Controlling Phase

5.2 How Project Monitoring and Controlling Works

Project monitoring and controlling involves the regular review of metrics and project status in order to identify variances from the project baseline. Variances are determined by comparing the actual performance metrics generated during project execution to the baseline metrics identified in the project management plan. The project manager and appropriate team members analyze these variances, including evaluation of potential impact. If significant variances are observed (i.e., variances that jeopardize the completion of the project objectives), adjustments to the plan are made by repeating and adjusting the appropriate project planning processes. A significant variance from the plan does not always require a change, but should always be analyzed to see if preventive action is warranted. For example, a late activity finish date may not jeopardize project completion and may not require any changes to the project management plan. Or, in other situations, a late activity finish date may invoke the change management process to adjust the staffing plan and budget to incorporate overtime, or extend the project schedule. Controlling also includes taking preventative action in anticipation of potential problems.

5.3 Impact of Project Monitoring and Controlling

Monitoring and controlling project performance enables accurate assessment of project progress, which in turn increases the likelihood of meeting stakeholder expectations. Projects seldom fail due to one issue. Project failure is more often a collection of relatively minor items that individually may have negligible impact in a specific project area. However, when looked at over the life of a project, the cumulative effect of seemingly minor items can cause significant impacts to cost, schedule, risk, and functionality which ultimately manifest themselves as deviations from the original project management plan.

A frequently overlooked opportunity that falls under the umbrella of monitoring and controlling is capturing lessons learned as a continuous process rather than as a single event at the conclusion of the project. It is an industry best practice to document lessons learned throughout the course of a project. One way to do this is to use a project journal at each project team meeting. Lessons learned are often the result of monitoring and controlling, and documenting lessons learned as they occur may carry forward throughout the life of the project.

The remainder of this chapter provides additional detail on monitoring and controlling the following aspects of the project management plan:

- Changes
- Scope
- Schedule
- Cost
- Risk
- Issues
- Quality

- Contract administration

5.4 Monitoring and Controlling Changes

Before reviewing the specific elements of change control, it is relevant to review the opening paragraph of the change management section of the project management plan:

The purpose of the change management plan is to describe the process involved with identifying, escalating and managing project changes. A project change is defined as something that is outside the documented and approved project scope or is a change to project requirements, project schedule or project cost (including resource effort). A project change requires approval for additional resources, funding or modifications to the project schedule. The change management process defines how to handle project changes that present either a negative or positive impact on deliverables, schedule, budget and/or resources. The enterprise PPM tool is the repository for all project changes.

The vast majority of projects encounter changes. Managing and controlling these changes are critical for overall project success. Change control involves the following main activities:

Influencing the activities that create changes to ensure that those changes are beneficial

- Analyzing the impact of potential changes
- Obtaining approval from appropriate stakeholders
- Managing the actual changes when they occur

Change requests may originate in various forms—oral or written, clear or subtle. They may also be driven by different factors internally or externally, by operation or regulatory requirements, or by technology limitations. Change requests may be submitted at varying levels in the organization, depending on the size or impact. However, a key facet to change requests is their central management by the project manager, change control board, and sponsors. All change requests must be entered in the enterprise PPM tool to provide continuity from initiation through approval or rejection. The project manager should follow a defined process for communicating approved changes to all team members in a timely fashion to lessen impact.

Change control is not the prevention of changes. Rather, it is concerned with identification and management of possible changes to the project. Management of the changes includes the administrative management, tracking, review, and assessment of proposed changes; the organized and timely review and decision on change approval; and the administrative process to ensure that the project team is informed of changes when they are approved.

5.5 Change Control Concepts

In the previous methodology phases, the concepts of project scope, schedule, and requirements were discussed. Change control is relevant to all of these. Overall, change control requires the following:

- Maintain the integrity of the performance measurement baselines. All approved changes should be reflected in the project management plan
- Ensure that any changes to requirements are reflected in the project scope.
- Coordinate changes across knowledge areas. For example, a proposed schedule change often affects cost, risk, quality, and staffing.

At key points in the project timeline, all project management plan items are baselined. Once they are baselined, changes to the baseline are managed through a formal change process.

5.6 Baseline

A baseline is defined as the original plan, for a project, a work package, or an activity, plus or minus approved changes. A modifier (e.g., project budget estimate, schedule baseline, performance measurement baseline) is usually included.

5.7 A Baseline Is a Ruler

A baseline provides the “ruler” by which a project can be evaluated. If the schedule baseline plan indicates that you should be 30 percent finished with an activity at a specific point, and you are 15 percent or 90 percent finished, you have a variance. But only by further investigation can an opinion be formed on the significance or overall importance of the variance.

5.8 Baseline Changes

Baseline changes are significant events and should not be made without consideration of their impact. Baseline changes are made to reflect a change in project management plan, not only when the project is behind schedule or over budget. A baseline change adjusts the ruler for the project. A variance *does not* justify a baseline change; it only indicates that the initial plan was not accurate. Baseline change should be handled through the change control process.

5.9 Baseline Control

Key aspects of baseline control include:

- A change control system is a collection of formal, documented procedures that defines the steps by which project changes are initiated, reviewed, approved, or denied. It includes the process, tracking systems, and approval levels necessary for authorizing changes. The change control system is described in the change management section of the project management plan.

- The change control system includes a Change Control Board (CCB) responsible for approving or rejecting change requests. The power and responsibilities of the CCB are defined in the project management plan and agreed upon by key stakeholders and the managing agency.
- The change control system also includes procedures to handle changes that may be approved without prior review (e.g., changes that occur as the result of an emergency). These changes must still be documented and captured so that they do not cause problems later in the project.

5.10 Monitoring and Controlling Scope

Project scope is first defined in the project charter during the initiation phase, described in further detail in the project management plan during the planning phase, and verified during the execution phase through structured walkthroughs of deliverables and formal acceptance by the customer. The focus of monitoring and controlling scope is to monitor project status and product scope and to manage changes to the scope baseline. According to PMBOK, controlling the project scope ensures all requested changes and recommended corrective or preventive actions follow the established change control process. The term “scope creep” refers to the uncontrolled expansion to product or project scope in which adjustments to schedule, budget, and resources are not made according to the established change control process.

Monitoring and controlling scope includes:

- Influencing the factors that create scope changes to ensure that the changes are beneficial
- Determining that scope changes have occurred
- Following established change control processes to implement changes
- Managing approved changes

Most scope changes require additional project funds, resources, and time. The project charter and project management plan identify stakeholders that are empowered to approve or reject change requests.

Impact of a scope change is felt throughout the planning phase processes and documents. The project management plan, including the WBS and project schedule, must be re-evaluated and updated to include the scope change impacts. Scope changes must be communicated clearly and effectively to the project team by the project manager. Team members must understand how the scope change affects their roles in the project.

5.11 Typical Inputs and Outputs for Monitoring and Controlling Scope

Inputs	Outputs
Project management plan	Project management plan updates
Requirements documentation	Change requests
Requirements traceability matrix	Project document updates
Work performance data and reports	Work performance information

Table 10 Typical Inputs and Outputs for Monitoring and Controlling Scope

Inputs:

- The baselined project management plan provides a definition of project and product scope from various perspectives; including narrative descriptions of the work to be performed, project deliverables, project approach, project results/completion criteria, and critical success factors.
- Requirements documentation may include a variety of materials such as business cases, functional requirements and use cases described in the Systems Engineering Methodology (SEM), user stories described in Agile development projects, and federal and state legislation. It is critical that stakeholders review and approve requirements documentation in order to set a baseline for monitoring and controlling requirements scope.
- A requirements traceability matrix is included in the SEM and provides bidirectional association from the origin of a requirement through design, construction, and testing to its final implementation. In systems development projects, requirements traceability is most often provided through an automated tool.
- Work performance data includes observations and measurements collected as activities and tasks are performed during the course of executing the project. Data is then compiled in to reports intended to inform stakeholders about project status, promote awareness, generate discussion, and support decision making. Performance reports also include analysis of variances between planned and actual scope.

Outputs:

- Changes in scope may be an expansion or reduction in scope of the project. Most change requests in scope are the result of the following:
 - An external event (e.g., a new regulation—a law that requires a change in how payments are determined)
 - An error or omission in the original definition of scope of the product (e.g., for systems development projects, failure to address multiple browser platforms)
 - An error or omission in the defining of the scope of the project (e.g., failure to include training in the project implementation)
 - A value-adding change (e.g., use of mobile applications and devices)

- If change requests are approved, the project management plan and other project documents must be updated to reflect the change. The project manager must effectively and clearly communicate the change to the team to prevent conflicting work.
- Work performance information and reports continues to be generated and shared with stakeholders.

5.12 Tools and Techniques for Monitoring and Controlling Scope

The primary tool for monitoring and controlling scope is variance analysis. Careful scrutiny of requirements documentation, requirements traceability, test plans, test results, and structured walkthrough data may disclose scope changes and scope creep. Additionally, frequent and effective communication among stakeholders not only verifies scope but also identifies potential scope changes.

The extension of variance analysis to impact analysis is necessary to generate a change request. Stakeholders must understand the impact of a potential scope change on schedule and cost in order to make an informed decision.

5.13 Monitoring and Controlling the Project Schedule

Schedule control is one of the most difficult and important activities within project control. The project schedule can be affected by a variety of issues, including changes in resource availability, funding, vendors, contracts, and even travel due to weather conditions. The ability of a project manager to manage the schedule and deliver on time is a high-visibility concern for project success from a customer point of view.

Although there may be numerous sources of schedule issues there should be a single, focused method for dealing with schedule changes. If a potential schedule problem is discovered, the problem must be investigated and the cause uncovered as soon as possible. Once the problem is discovered, a plan should be created for correcting the problem in the shortest allowable time with the least impact. It is also advisable to bring forward alternatives of varying costs.

Schedule control is something that typically is managed at the project level by the project manager. However, it is very important to make stakeholders aware that a schedule change has occurred or is imminent. Furthermore, stakeholders need to be made aware of what is being done to fix the issue and the impact it will have on the project's performance and deliverable.

5.14 Typical Inputs and Outputs for Monitoring and Controlling the Project Schedule

Inputs	Outputs
Project schedule	Schedule updates
Performance reports	Schedule revisions
	Corrective actions
	Lessons learned

Table 11 Typical Inputs and Outputs for Monitoring and Controlling the Project Schedule

Inputs:

- The project schedule is developed and approved in the planning phase and baselined at the beginning of the execution phase. As project execution progresses, the schedule is updated to reflect actual progress and is modified to reflect approved changes. The schedule serves as the basis for measuring and reporting schedule performance.
- Performance reports, created as part of the execution phase, provide information on the project's performance, as measured against the project schedule, indicating if activities were started and completed on the planned dates. When significant variances are identified, further analysis is performed to determine if there is a need for corrective action. Schedule performance reports may also be effective in alerting the project team of current or pending problems that may need to be mitigated by prompt corrective action.

Outputs:

- Schedule updates are any modifications to schedule information that are used to manage the project. Updates are normally provided on a regular basis. The frequency must be determined in conjunction with the reporting requirements. Appropriate stakeholders must be notified as needed. Schedule updates may or may not require adjustments to other aspects of the overall project management plan.
- A schedule revision is a modification to the start and/or finish dates of the approved project schedule. If revisions are severe enough, the schedule may need to be re-baselined with an approved change request in order to provide realistic data to measure performance.
- Corrective actions are any actions taken in response to schedule variances in order to bring expected future schedule dates in line with the baselined project management plan dates. Corrective action for schedule variances may be in the form of applying additional resources, adjusting work schedules, compressing future activities, or other actions to ensure completion of an activity on time, or minimize the previous variance. Corrective actions may be made for positive and negative variances.
- Lessons learned document causes of variances and the reason for the corrective action chosen. The documentation may then be used to develop a historical record for both this project and

future projects. The lessons learned, if used, should improve the organization's ability to estimate, execute, and manage both current and future projects.

5.15 Tools and Techniques for Schedule Control

The enterprise PPM tool supports schedule updates, reporting, monitoring, and control. It is important to integrate schedule control with the overall change control process.

The project schedule is one of the more visible and well-known control mechanisms of project control. However, it has marginal (positive or negative) value by itself. Viewed in isolation, the schedule is of limited value, especially if it is based on poor planning, unclear requirements, limited quality control, or if cost control is not taken into account. For example, the schedule may show that the project is 50 percent complete, which is on target, but the project may have spent 65 percent of the total project budget. Project managers must ensure that the schedule is evaluated against a comprehensive plan and, where possible, analyzed with other metrics to ensure that the overall picture provides an accurate representation of project status.

Performance measurements such as Earned Value Management (EVM) assess the magnitude of variations. An important part of schedule control is to decide if the schedule variation requires corrective action. Performance measures provide an objective view to assist management in making a decision on more than just a gut feeling about the significance of a variance. For example, a minor delay on a non-critical activity may have little effect on the overall project, while a much shorter delay on a critical activity may require immediate action.

Additional planning includes prospective changes that may require new or revised estimates of activity duration, modified activity sequences, or analysis of alternative schedules.

The following graphic illustrates schedule variance as a component of earned value.

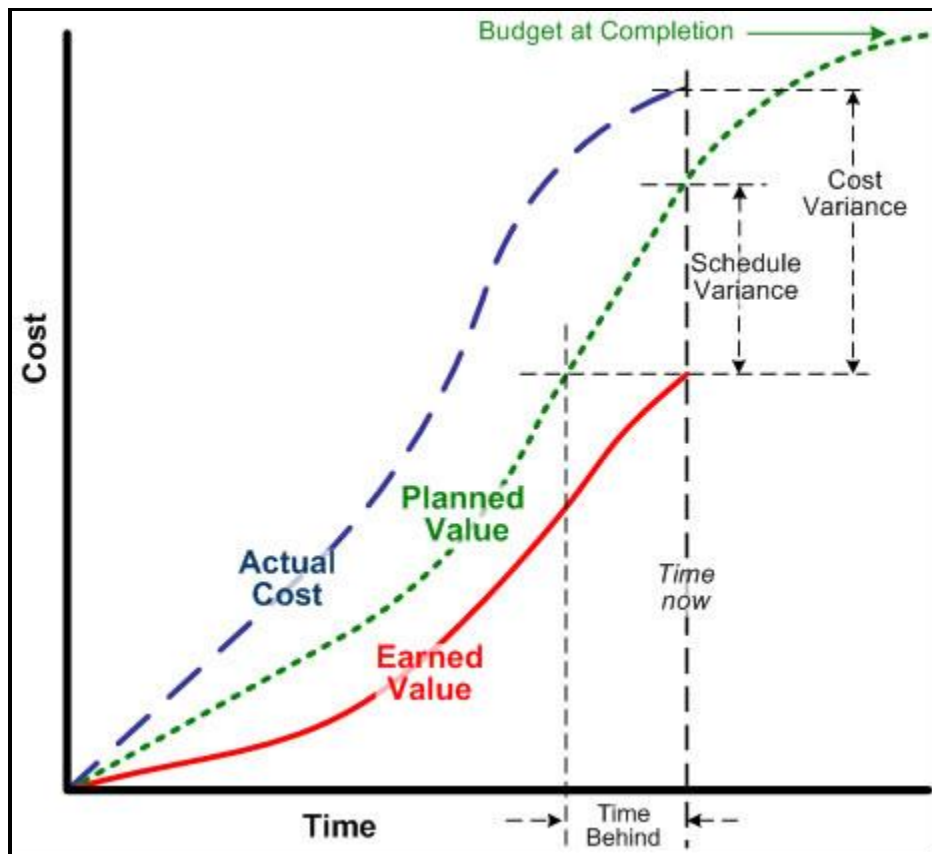


Figure 16 Schedule variance as a component of earned value

The State of Michigan has established criteria for reporting project status, including schedule variance as well as earned value. The following chart depicts “stoplight status” for various performance measures.

Criteria	Green	Yellow	Red
Schedule Variance	The schedule indicates the major milestones are on schedule	The schedule indicates that one or more of the major milestones will be missed by $\leq 20\%$ of phase duration	The schedule indicates that one or more of the major milestones have been missed or will be missed by $> 20\%$ of phase duration
Cost Variance	The variance between the budget and actual costs is $\leq 10\%$	The variance between the budget and actual costs is $> 10\%$ and $\leq 20\%$	The variance between the budget and actual costs is $> 20\%$
Test Progress	The percent completion of planned test execution minus percent completion of actual Test Execution $< 20\%$	The percent completion of planned test execution minus percent completion of actual Test Execution $\geq 20\%$ and $< 30\%$	The percent completion of planned test execution minus percent completion of actual Test Execution $\geq 30\%$ or after surpassing 75% of the planned test duration, the percent completion of planned test execution minus percent completion of actual Test Execution $\geq 20\%$
Earned Value Schedule Variance (SPI) (If using Earned Value)	$.9 \leq SPI \leq 1.2$	$.8 \leq SPI < .9$ or $1.2 < SPI$	$SPI < .8$
Escalated Issues / Risks	Issues and Risks have a documented Mitigation Plan and are on target.	Escalated Issues or Risks, designated as critical or high priority, remain unresolved for more than one week after the target date, resulting in a high level of risk to the project. Issues and Risks do not have a documented Mitigation Plan.	Escalated Issues or Risks designated as critical or high priority, remain unresolved for more than two weeks after the target date, resulting in a high level of risk to the project. Critical or high Issues and Risks do not have a documented Mitigation Plan.
Testing Defect Rate	The planned test cases / scenarios have a defect rate of 15% or less	The planned test cases / scenarios have a defect rate $> 15\%$ and $\leq 20\%$	The planned test cases / scenarios have a defect rate $> 20\%$

Figure 17 Stoplight Status Chart

5.16 Monitoring and Controlling Cost

Actual project costs may overrun the estimated budget for many reasons. Often it is not a single problem but a series of small problems that, combined, permit cost control to be sacrificed and prevent the project from being completed successfully. Cost control contains the following attributes:

- Influencing the factors that create changes to the project budget estimate to ensure that the changes are beneficial.
- Analyzing the impact of potential budget changes
- Obtaining approval from appropriate stakeholders
- Managing the actual changes when and as they occur

Cost control includes the following:

- Monitoring cost performance to detect variances from the project management plan
- Ensuring that all appropriate changes are recorded accurately in the project budget estimate
- Preventing incorrect, inappropriate, or unauthorized changes from being included in the project budget estimate
- Informing appropriate stakeholders of authorized changes

Cost control is not simply a reporting process. It includes the searching out of the “why” for both positive and negative variances between the planned and actual costs. It must be thoroughly integrated with other control processes (scope control, schedule control, quality control, and others). For example, inappropriate responses to cost variances can cause quality or schedule problems or produce an unacceptable level of risk later in the project.

5.17 Typical Inputs and Outputs for Monitoring and Controlling Cost

Inputs	Outputs
Project budget estimate	Revised cost estimates
Performance reports	Budget updates
Change requests	Corrective actions
	Estimate at Completion (EAC)

Table 12 Typical Inputs and Outputs for Monitoring and Controlling Cost

Inputs:

- A project budget estimate is a time-phased budget that is used to measure and monitor cost performance on the project. The project budget estimate is developed as part of the project management plan.

To summarize, a work breakdown structure is initially developed to describe the products. It is subsequently decomposed into smaller elements and then used as a basis for a series of estimates for specific activity completion. After all activities and their related costs are identified, the activities are linked into a logical order of completion and relationships are established (dependencies). The resulting network schedule produces a time-phased relationship of work to be completed. After summing the activity cost estimates in the same network time-phased relationship, the cost performance of the project can be established. When the schedule is baselined, the cost performance is called the "project budget estimate".

- Performance reports provide information on the actual versus planned cost, indicating those items that did not perform as planned. They may also help identify trends, or possible future problems, to the project. Performance reports are also used to provide metrics and information to forecast future work on the project, and related similar work to allow improved estimates of similar work.
- All change requests related to cost must be entered in the enterprise PPM tool to provide continuity from initiation through approval or rejection.

Outputs:

- Revised cost estimates are modifications to the cost information used to manage the project. They may be done in response to changes, additional information received from other activities, or other reasons. Stakeholders should be kept apprised of significant changes, either through normal reporting systems or exception reporting as outlined in the project budget estimate. These modifications may or may not affect other aspects of the project management plan.
- Budget updates are changes to an approved project budget estimate and are normally done in response to a change in project scope. They are synonymous with schedule revisions as outlined in the previous section. Budget updates may also be required if cost variances become so severe that the current plan no longer provides a realistic perspective on project performance.
- Corrective actions are anything done to bring expected future performance in line with the project management plan.
- EAC is a forecast of total project costs based on project performance and provides management with insightful perspectives on project status, health, and forecasting information.

5.18 Tools and Techniques for Cost Control

The enterprise PPM tool supports budget updates, reporting, monitoring, and control. The enterprise PPM tool requires the reporting of actual performance on a consistent and regular basis for evaluation against project budget estimates. It is important to integrate cost control with the overall change control process.

Performance measurement helps to assess the magnitude of any variations that occur. One of the primary objectives of cost control is to determine any variances that are driving change and then decide if the variance needs corrective activities applied. Applied corrective actions are based upon information obtained from established performance measures.

Understanding that a project is rarely executed according to the original plan, iterative planning is used to re-estimate project costs or to study alternative approaches in executing the project management plan.

The following graphic shows planned versus actual cost without earned value, which provides a less than comprehensive view of project status.

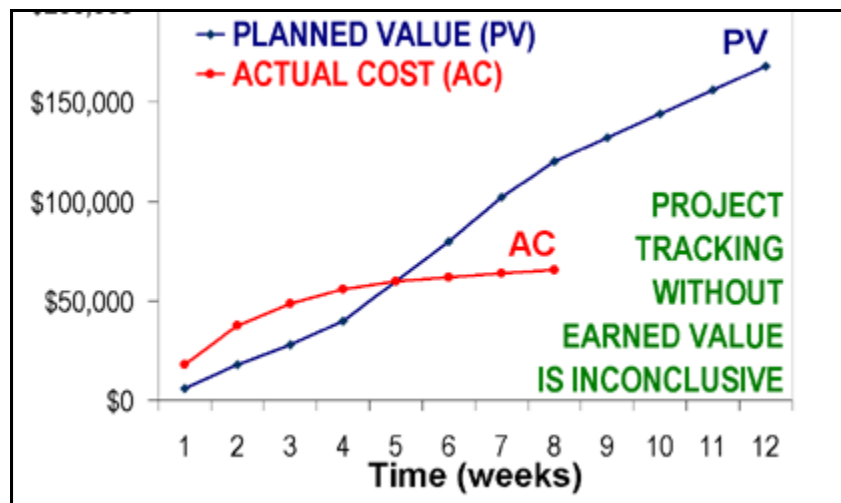


Figure 18 Planned versus Actual costs Without Earned Value

Below is a graphic showing Estimate at Completion, which provides a comprehensive view by taking both schedule and cost variance into consideration.

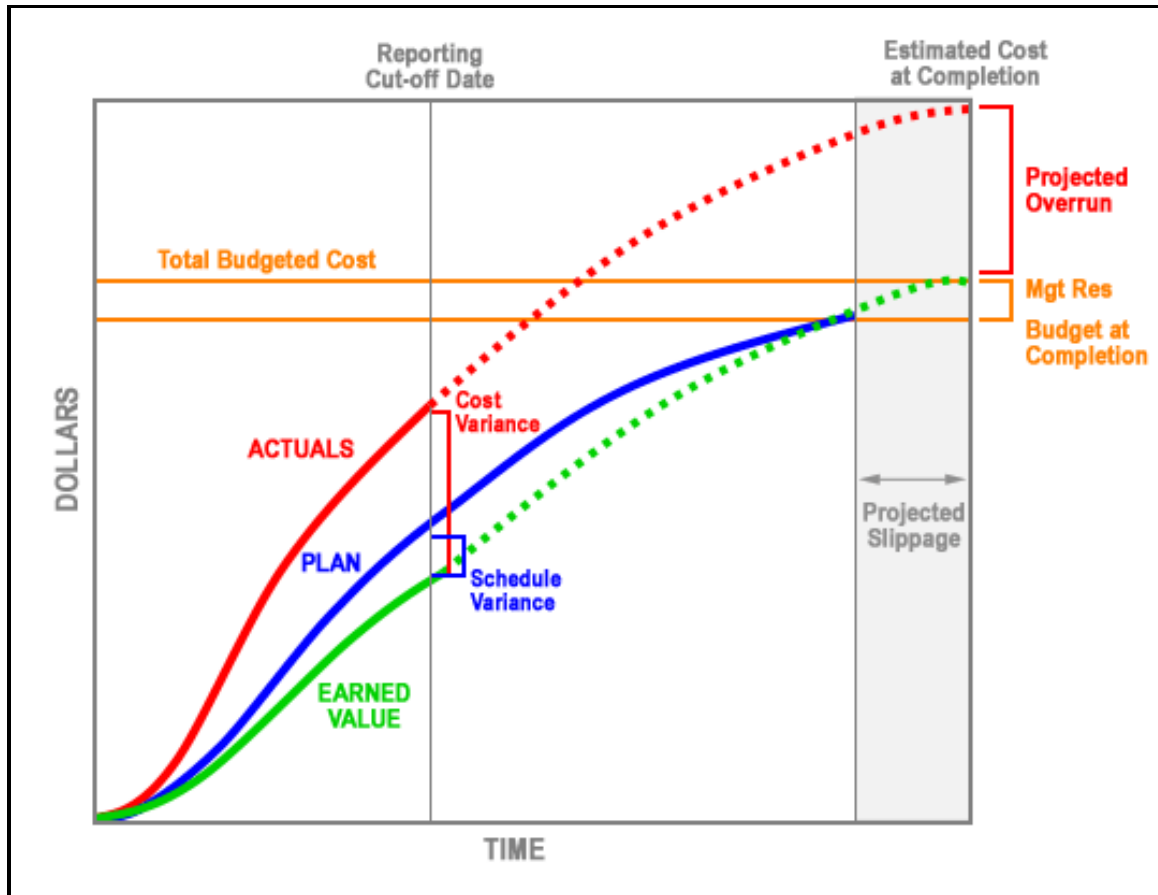


Figure 19 Estimate at Completion

Note that the stoplight status criteria in the scheduling section also includes cost variance.

5.19 Monitoring and Controlling Project Risk

Monitoring and controlling risk involves executing the risk management section of the project management plan in order to respond to risk events over the course of the project. When changes occur, the basic cycle of: identify, qualify/quantify, and respond is repeated. It is important to understand that even the most thorough and comprehensive analysis cannot identify all risks and probabilities correctly, monitoring, controlling, and iteration are required.

5.20 Typical Inputs and Outputs for Monitoring and Controlling Project Risk

Inputs	Outputs
Risk management section of the project management plan	Corrective action
Actual risk events	Updates to the risk management section of the project management plan
Additional risk identification	

Table 13 Typical Inputs and Outputs for Monitoring and Controlling Project Risk

Inputs:

- The risk management plan is developed during the planning phase and documented in the project management plan
- Actual risk events are those identified risks that actually do occur. The risk manager and project team must recognize that an actual risk has occurred so that a response plan may be developed and implemented.
- Additional risk identification must be performed as project performance is measured and reported since potential risk events or sources, if not previously identified, may surface.

Outputs:

- Corrective action consists primarily of performing the planned risk response (e.g., implementing contingency plans or workarounds).
- As anticipated risk events occur or fail to occur, and as actual risk events are evaluated, estimates of probabilities and value, as well as other aspects of the risk management plan, should be updated.

5.21 Tools and Techniques for Risk Control

- The enterprise PPM tool supports risk monitoring and control through its risk register.
- If the risk event was not anticipated or the effect is greater than expected, the planned response may not be adequate, and it will be necessary to repeat the response development process and perhaps the risk quantification process as well.

5.22 Monitoring and Controlling Issues

Monitoring and controlling issues involves executing the issue management section of the project management plan in order to identify and resolve issues in a timely and effective manner. The typical inputs and outputs for monitoring and controlling issues are very similar to those for risk, and are not repeated here. The enterprise PPM tool supports issue management.

5.23 Monitoring and Controlling Quality

Quality assurance and control involve monitoring specific processes and results to determine if they comply with relevant quality standards as well as identifying ways to eliminate causes of unsatisfactory results. Quality monitoring and controlling activities are performed throughout the project. Project results include both product results such as deliverables and management results such as cost and schedule performance.

5.24 Typical Inputs and Outputs for Monitoring and Controlling Quality

Inputs	Outputs
Work results from quality assurance activities described in the project management plan	Acceptance/Rejection decisions
Structured walkthrough meeting records	Rework
Test results such as defect reports	Process improvement plan
Checklists	Lessons learned

Table 14 Typical Inputs and Outputs for Monitoring and Controlling Quality

Inputs:

- Work results include both process and product results, comparing planned results included in the project management plan with actual results of quality assurance activities.
- The Structured Walkthrough process is used to identify and correct defects by evaluating a deliverable according to SUITE guidelines and project standards. A Structured Walkthrough can be formal (meeting with a facilitator to guide the process) or informal (document reviewers email their comments to a scribe who will compile the results). This process is intended to reduce the number of problems and warranty issues, as well as reduce the time and costs resulting from rework. The purpose of the Structured Walkthrough feedback form is to document peer review findings which include the following:
 - Action Items
 - Errors
 - Issues/Risks
 - Suggestions/Omissions

- Deliverables are reviewed for quality in terms of the following criteria (as applicable):
 - Clarity
 - Contractual concerns
 - Functional content and accuracy
 - Performance impact
 - Project standards/format
 - Scope
 - Technical content
 - Value/benefit to the client
- Test results and defect reports are used in system development projects to document expected and actual outcomes from various types of testing, including unit, integration, system, and user acceptance tests.
- Quality assurance and quality control activities rely on various checklists to ensure compliance with project, process, and product standards.

Outputs:

- Measurement of acceptance/rejection decisions indicate the overall quality as well as the incidence of rework required to meet quality objectives
- Rework is measured by the effort, time, and cost of regenerating deliverables that meet stakeholder expectations for quality
- Process improvement plan details the steps necessary to revise a process to meet quality standards. The plan may entail graphic representations of the process, including inputs and outputs, identification of interfaces, development of measurement and analysis tools, and targets for improved performance.
- Lessons Learned

5.25 Tools and Techniques for Monitoring and Controlling Quality

- The structured walkthrough and peer reviews are powerful industry standard tools to monitor and control quality. These reviews are often referred to as inspections, and include activities such as measuring, examining, and testing to determine whether results conform to requirements. Automated testing tools are recommended for information technology projects.
- Typical quality techniques include:
 - Control charts

- Pareto diagrams
 - Statistical sampling
 - Flowcharting
 - Trend analysis
- Following is a typical test report showing expected results and actual defects.

Testing Status					
04/02/12	Testing front-end starting on schedule.				
04/04/12	20 open defects slated for retest at COB 4/5. Remaining front-end test scenarios executing today. Batch processing to begin tomorrow - advancing quarterly data in prep for year-end processing. Qtr validation 4/6, annual validation beings 4/9.				
04/06/12					
04/09/12					
04/11/12					
04/13/12					
04/16/12					
04/18/12					
04/20/12					
04/23/12					
04/25/12					
04/27/12					

Test Scenerio Stats by Week					
	Week1	Week2	Week3	Week4	Total
Total Tests	31	50	38	15	134
In Process	4	0	0	0	4
Passed	13	0	0	0	13
Failed State	3	0	0	0	3
Blocked	11	0	0	0	11
Cancel	0	0	0	0	0
Not Executed	0	50	38	15	103
Pass Rate	41.9%	0.0%	0.0%	0.0%	

All Defect Stats *			
Defect Counts			
Total	Closed	Retest	Open
22	0	0	22

Defects Per Test	1 38/100
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Defect by Root Cause					
Code	Data	Design	Environ.	Rqmnts	Other
2	0	13	0	3	0

Defects by Severity		
High	Medium	Low
0	12	10

*Note: Defects will not always correlate to a specific test scenario

Table 15 Typical Test Report



Table 16 Typical Test Report

Note that the stoplight status criteria include test progress and testing defect rate.

5.26 Monitoring and Controlling Contract Administration

Contract administration control is the process of ensuring that the vendor's performance meets contractual requirements of deliverable based contracts. This is accomplished through the use, and monitoring, of a project management plan from the vendor, periodic progress reports, and the completion of deliverables as delineated in a project statement of work. Note that resource managers are typically responsible for work performance of contract staff under staff augmentation contracts, but in certain circumstances, the project manager may play a key coordination role.

CHAPTER 6.0 - CLOSEOUT

6.1 Project Closeout Phase

The last major phase of a project's life cycle is project closeout. Project closeout is performed after all defined project objectives have been met and the customer has accepted the project's product.

The Closing Process Group consists of those processes performed to conclude all activities across all project management process groups to formally complete the project, phase, or contractual obligations.

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Figure 20 The Closing Process Group

Project closeout includes the following key elements:

- Review the project management plan to ensure that all project work is completed, the project has met its objectives, and the customer has accepted the final product
- Archive project records
- Document project results in the project closure report
- Ensure closure of financial records and contracts
- Complete administrative closeout functions
- Conduct and document a lessons learned session
- Transfer operational and support responsibilities to the appropriate group
- Celebrate project success

Project Management Closeout Phase

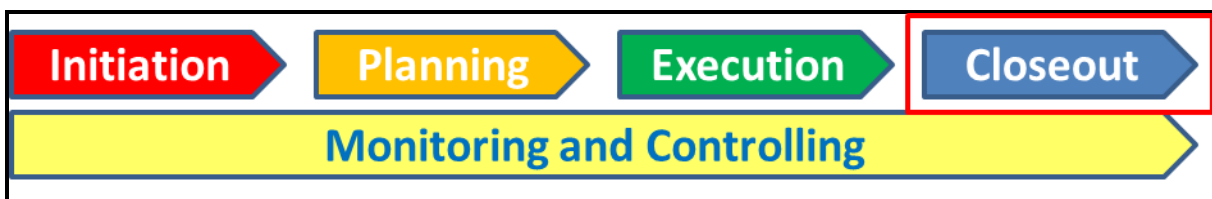


Figure 21 Project Management Closeout Phase

During the closeout process, the project manager reviews the project management plan to ensure that the product or final project deliverable has been formally accepted by the customer and that other more administrative actions to ensure project closure are completed.

The fact that project closeout occurs at the end of the project does not mean that all project closeout activities need to be delayed until then. As project phases come to an end it is important to conduct milestone reviews to ensure that phase activities have been successfully completed to the satisfaction of all involved. This relieves the project manager and project team of potentially having to deal with a high volume of open issues and outdated information.

6.2 Archive Project Records

Historical project data is an important source of information to improve future projects. One of the first things a project manager does during the initiation phase is to review lessons learned from similar past projects before embarking on a new project. It may also be necessary to consult with other project managers to obtain a full understanding of the lessons learned or to review other historical project records. The Enterprise Portfolio Management Office maintains libraries of lessons learned and best practices.

Historical project data is archived in both the enterprise PPM tool and project folders that reside on SharePoint sites.

Project data residing in the enterprise PPM tool includes:

- Schedule
- Budget
- Change controls
- Risks
- Issues
- Accomplishments
- Next Steps
- Status Reports (4-up reports)
- Attachments that support the topics above

Project data residing in project folders typically includes:

- Project charter
- Project management plan
- Lessons learned
- Project closure report
- Correspondence
- Meeting notes
- Status reports (narrative reports more detailed than the 4-up report)

- Structured walkthrough meeting records
- Stage exit records
- Contracts
- SEM and other appropriate SUITE documents
- Reference documents describing location and management of files, programs, tools, and technical documents placed under configuration management. Note that these reference documents address all components of the State System Engineering Methodology.

All records should be stored according to the State of Michigan record retention guidelines. Many technical records and electronic versions will be transferred to State personnel responsible for maintenance and operation of the system. The project archive includes an overall list and high level description of all records in the archive and a point of contact if further information is needed.

The project archive contains information that may be required for audits that may be conducted at a later time.

Project archives provide valuable information for improving not only estimating but also team performance. Project archives are rich in data that can be used for analytic purposes to improve overall productivity, performance, and project delivery.

6.3 Project Closure Report

The purpose of the project closure report is to provide a summary of the products delivered, comparison of baseline plans and actual performance, project metrics, lessons learned, and feedback from stakeholders. It also includes a list of outstanding issues and defects, if any. The report serves as the official closure of the project and provides a permanent record for reference for future project teams. The report includes summary information on the following topics:

- **Schedule performance**

The project manager should refer to the enterprise PPM tool to compile information on:

- Total duration of the project including start and end dates
- Schedule variances including difference between baseline and actual end dates (days and percent of total)
- Schedule performance rating (red, yellow, or green)
- Explanation of key variances

- **Budget performance**

The project manager should refer to the enterprise PPM tool to compile information about the final actual cost of the overall project

- Breakdown of final cost by category (DTMB resources, contractors, hardware, software, other), including total dollar cost per category and percent of overall budget)
- Budget variances including difference between baseline budgeted cost and actual cost (dollars and percent)
- Budget performance rating (red, yellow, or green)
- Explanation of key variances

- **Change management**

The enterprise PPM tool contains information for the project manager to compile regarding:

- Total number of changes
- Breakdown of changes
- Number of change requests submitted vs. approved and implemented
- Number of approved change requests that impacted schedule
- Number of approved change requests that impacted budget
- Number of approved change requests that impacted scope
- Highlights of key changes

- **Quality management**

The project manager should review structured walkthrough records and artifacts produced by any testing tools used on the project. Note that structured walkthroughs are conducted for all project deliverables, including non-development projects, such as infrastructure. Quality management closeout information includes information such as:

- Total defects identified in structured walkthrough process per stage
- Total defects identified during testing
- Total defects resolved prior to implementation
- Conclusions and additional comments

- **Risk and issue management**

The project manager should refer to the risk and issue logs in the enterprise PPM tool and to the project management plan for definitions of high, medium and low. Closeout information for risk and issue management includes:

- Risks:
 - Total number of risks accepted
 - Total number of risks transferred
 - Total number of risks mitigated
 - Total number of risks avoided

- Summary of mitigation actions on key project risks
- Issues:
 - Total number of issues by priority (high, medium, and low)
 - Total number of issues resolved at first level
 - Total number of issues escalated to high level
 - Total issues resolved
 - Unresolved issues
- Summary of risk and issue impact on project schedule, budget, and scope

- **Human resource management**

This section of the project closure report is largely dependent on the project manager's perspective. The project manager should review applicable project records related to team training, change requests related to staffing, staff turnover, etc. to answer the following questions:

- Did the project team have the right skills? If not, was training provided?
- Did the project team have enough people to execute the project plan? If not, what was the impact and what actions were taken?
- Were resources available as planned?
- Additional comments

- **Project organization structure**

This section is also largely dependent on the project manager's perspective to answer the following questions:

- Were sponsors and decision makers available when needed outside regularly scheduled meetings?
- Were escalated issues resolved promptly?
- Were decisions made in a timely manner? If not, what was the impact?
- Additional comments

- **Communication management**

This section is largely dependent on the project manager's perspective and lessons learned documentation to answer the following questions:

- Based on your project communication management plan, what worked well?
- What communication items need improvement?

- **Customer feedback**

- The project manager summarizes the key findings of customer feedback survey(s), if any.

- **Lessons learned**

- The project manager summarizes the key findings from lessons learned document.

The project manager reviews the project closure report with the sponsors and obtains their approval signatures.

6.4 Close Financial Records and Contracts

Financial closure is the process of completing and terminating the financial and budgetary aspects of the project. Financial closure includes both project account and contract closure.

- **Project Account Closure**

Project account closure is an internal process that formalizes project completion for the project team. It is important for the project manager to set a definitive date for project completion to ensure proper closeout. For example, if a completion date is not set for the project account, it is possible that project personnel could continue to record time and effort to the project. If this were to happen, project cost overruns would occur and accurate reporting would be compromised.

The completion date for a project is the date by which all project-related activities needed to produce the product should be completed. Beyond this date, there should be no need to apply labor or resources against the project because it will be complete and transferred to operations.

Most projects have an account or activity code associated with them that enable finance departments to track labor costs. These account codes must be deactivated so that personnel are no longer able to charge time against the project or use the project codes to purchase materials or other resources. Closure of the project accounts should be formalized in a written request from the project manager to the financial organization.

The project manager should notify the project team and management as far ahead of time as possible when the project will be coming to completion. Timely notification of project completion enables the team to know that they will not be able to charge their time against a project or purchase resource beyond a certain date. It also allows management to better understand resource availability and to plan for subsequent activity. And finally, publicizing a completion date creates a sense of urgency to resolve outstanding issues and wrap up activities.

The completion date of the project is included in the project schedule as well as other status reports. It is nonetheless a good practice to remind the project team ahead of time that account codes will become inactive on a certain date.

- **Contract Closure**

Contract closure is the process of terminating a contract between the state and outside organizations or businesses to provide services or products necessary for project delivery. Examples are contracts for software, technical support, consulting, or services supplied during the project that the State decided not to perform itself. Contracts can be brought to closure for a variety of reasons, including contract completion, early termination, or failure to perform. Contract closure is a typical but important part of project management.

The project manager works closely with the contract administrator to close a contract. The project manager is typically required to collect information relevant to the contract, such as the original contract and supporting documentation such as schedules, contract changes, and performance reports. This documentation needs to be reviewed thoroughly to ensure that there are no outstanding contract issues that require follow-up and resolution.

The contract administrator is responsible for closing the contract.

6.5 Complete Administrative Closeout Functions

- **Project staff**

When a project comes to an end it is important to return team members to their home organization or available resource pool as quickly as possible. This ensures resources are applied efficiently and effectively.

- **Facilities**

If the team occupied a dedicated facility for a period of time during the project, the project manager should inform appropriate facility staff that the space used for the project will become available again.

6.6 Lessons Learned

The purpose of conducting and documenting lessons learned is to help the project team share knowledge gained from experiences that may benefit the entire organization in their future project work. This knowledge includes both positive and negative findings, and identifies practices the organization wants to repeat as well as avoid in the future. The lessons learned are captured within a lessons learned journal on a SUITE form.

The lessons learned session is often conducted at the end of the project, at the end of major milestones or project stages, or as a retrospective at the end of each sprint in the Agile world. However, it is considered a best practice to document lessons learned throughout the course of any project. One way

to do this is to briefly discuss lessons learned at each team meeting and record them throughout the project in a lessons learned journal.

At the end of the project, the project manager invites key stakeholders to a lessons learned meeting. For large and complex projects, it may be necessary to segment stakeholders and convene multiple sessions. If a lessons learned journal was kept throughout the course of the project, it can serve as a focal point for group discussion. The following questions can stimulate discussion:

- What areas does the group agree are the biggest success on the project?
- What were things that we did very well and want to do the same again on the next project?
- What were things that we did well, but could improve, and how?
- What were things that we need to improve?
- What were the challenges that we encountered during the execution of the project that we would not want to repeat?
- What areas were overlooked on this project?

The project manager is responsible for documenting the lessons learned discussion. According to PMBOK, “lessons learned documentation includes the causes of issues, reasoning behind the corrective action chosen, and other types of lessons learned about communications management. Lessons learned need to be documented and distributed so that it becomes part of the historical database for both the project and the performing organization.”

Note that lessons learned are summarized in the project closure report. The audience for the project closure report is primarily project sponsors and future project managers, who share an interest in successful project delivery and process improvement.

6.7 Transfer operational and support responsibilities to the appropriate group

For system development projects, transfer of operational and support responsibilities to the appropriate group occurs in the final stage of the lifecycle, implementation. The last chapter of the SEM manual provides a description of the implementation process, including the following two plans:

- **Transition Plan (SEM-0701)**

Describes and plans all activities related to transitioning a system or application to production after the customer has accepted the product. The plan includes sections for Infrastructure Services, Operational Scenarios, and Transition Planning.
- **Maintenance Plan (SEM-0301)**

Provides information on product status, roles and responsibilities of the maintenance team, management approach, and technical approach.

Development and approval of these two plans is a collaborative effort involving the project manager, appropriate project team members, and managers and staff of the organizational unit that will be responsible for operations and support.

For projects in which the product or system was developed by contract resources, a warranty is sometimes included for a specified period of time. It is important to include warranty information in the transfer of products or systems to operational status.

All documentation that has anything to do with the product or system (including design documents, schematics, technical manuals) must be finalized and transferred to the operations and support organization.

6.8 Celebrate Project Success

Celebrate the success of completing a project! Recognizing and appreciating individual and team contributions are important parts of project closeout. Recognition may be formal or informal, and the project manager should select types of recognition that will be valued by both individuals and by the entire team. Informal recognition of a job well done could be a lunchtime pizza get together or an informal gathering after work. Formal recognition could include expressions of praise and appreciation by executive management at a key meeting or large gathering, plaques, gift certificates, and information in professional journals.

RESOURCES AND REFERENCES

[Agile Process Guide \(Intranet only\)](#)

[A Guide to the Project Management Body of Knowledge \(PMBOK Guide\) Fifth Edition](#)

[Capability Maturity Model Integration \(CMMI\) for Development v1.3](#)

[Enterprise Architecture \(Intranet only\)](#)

[Enterprise PPM Tool \(Changepoint\) \(Intranet only\)](#)

[Infrastructure Services Request \(ISR\) \(Intranet only\)](#)

[Look and Feel / ADA Review](#)

[Michigan Civil Service Commission – Job Specifications](#)

[PMP Exam Prep \(Rita Mulcahy\)](#)

[PMM Forms](#)

[Project Estimating Guide \(Intranet only\)](#)

[Project Initiation and Purchasing Processes for Commercial Off-the-Shelf Software \(COTS\) \(Intranet only\)](#)

[Project Management Key Terms, Definitions, and Acronyms \(Intranet only\)](#)

[Project Quality Assurance \(PQA\) Process Manual](#)

[SEM Manual](#)

[SEM Express Manual](#)

[Software Engineering Process Group \(SEPG\) Guidebook](#)

[SOM DTMB Project Roles and Responsibilities Reference Guide \(Intranet only\)](#)

[Stage Exit Process Guide](#)

[Structured Walkthrough Process Guide](#)

[SUITE sites \(Internet and Intranet\)](#)

[Testing Process Manual](#)

[Usability and User Design \(Intranet only\)](#)